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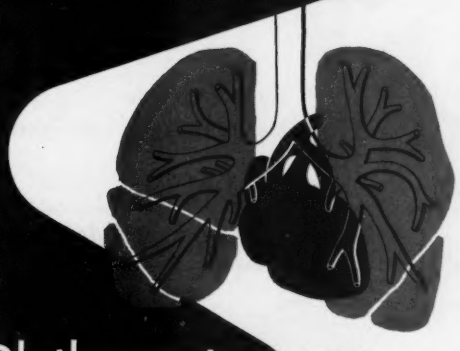

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Volume 245 JULY 26, 1951 Number 4

SOME SECONDARY EFFECTS OF SYMPATHECTOMY*

With Particular Reference to Disturbance of Sexual Function

GEORGE P. WHITELAW, M.D.,† AND REGINALD H. SMITHWICK, M.D.‡

BOSTON

THROUGH the work of Bernard,[1, 2] Gaskell,[3, 4] Langley,[5-8] Cannon,[9-14] White,[15, 16] Smithwick,[17-19] Kuntz[20] and others, the diversified activities carried out by the autonomic nervous system have been greatly clarified. However, many aspects of these problems still challenge solution.

If a portion of the autonomic nervous system is removed to modify a specific disease process, unrelated physiologic mechanisms will also be affected. The degree to which these other mechanisms may be affected often governs the selection of operative procedures. The results produced by interfering with mechanisms other than those for which the operation is performed might be designated as side-effects or secondary effects. These have recently been discussed by Fowler and deTakats.[21]

TABLE 1. *Summary.*

Questionnaires sent	265
Questionnaires returned	183 (69%)
Lumbodorsal splanchnicectomy and sympathectomy	116
Lumbar sympathectomy	23
Transthoracic splanchnicectomy and sympathectomy	19
Dorsal sympathectomy	3
Total	161
Returned without names	17
Discards (previous cerebrovascular accident or prostatectomy)	5
	183

In our experience, some secondary effects that may occur after operations on the so-called sympathetic division of the autonomic nervous system are: postural hypotension, cardiac symptoms, hyperhidrosis of the undenervated areas, accentuation of the vasomotor tonus of the undenervated areas, temporary disturbance of gastrointestinal-tract function, Horner's syndrome and derangement of sexual function.

Each of these matters warrants a separate discussion.

The secondary effects of sympathectomy to be discussed in this paper are those connected with derangement of sexual function, specifically impotence, or interference with erection, and sterility, or interference with ejaculation. Sterility, of course, would always follow failure of ejaculation unless some very complicated method were devised for recovering sperm from the seminal vesicles or possibly from the bladder. We are not familiar with any such cases. It is our belief that knowledge of this matter has been gained for the most part from casual questioning and information volunteered by patients. We thought that it might be of in-

TABLE 2. *Analysis of 161 Cases.*

	Cases	Percentage
General feeling		
Good	118	74
Mediocre	30	19
Poor	11	7
Symptoms		
Better	141	87
Same	15	9
Worse	5	3
Patients' evaluation of operation		
Worth while	137	85.0
Not worth while	7	4.7
Undecided	17	10.0
Sexual function decreased		
In any respect	70	42.8
Significantly	45	29.9
Sexual function increased	11	7.0
Disturbance of erection	44	27.5
Change in ejaculation		
Temporary loss	12	7.6
Permanent loss	31	19.8

Age grouping (at time of operation)

Age	All Cases	Significant Changes
20–29	11– 7%	1
30–39	45–28%	14
40–49	65–40%	17
50–59	34–21%	9
60–69	5– 3%	4

Time after operation	
Less than 1 year	15
1 year to 7 years	146

*Presented before the Boston Surgical Society on February 27, 1950.
From the departments of Surgery of the Massachusetts Memorial Hospitals and Boston University School of Medicine.

†Visiting surgeon, Massachusetts Memorial Hospitals; assistant professor of surgery, Boston University School of Medicine.

‡Surgeon-in-chief, Massachusetts Memorial Hospitals; professor of surgery, Boston University School of Medicine.

terest to question a group of men and thereby obtain more precise knowledge of *what* happens after certain operations. Poppen and Lemmon[22] and Hamlin, Warren and Kennard[23] have mentioned this matter briefly. Later in this presentation we will hypothesize concerning *how* it happens, from the standpoint of both anatomic pathways and physiologic mechanisms.

It can be seen from Table 1 that the effects following lumbodorsal splanchnicectomy comprise the largest group of cases. This was our primary interest in this project. Smaller groups of the so-called transthoracic or nearly total dorsal sympathectomy and splanchnicectomy and procedures confined to the lumbar area were thought to be of sufficient interest to include here. Larger groups of cases are needed to make the results statistically significant.

The results presented have been attained through questionnaires (Table 2). We realize that a study of this sort is far from perfect, as questionnaires are wholly subjective. We have no objective data. Obviously, however, an investigation of this variety must be made through the subjective approach.

It has been apparent from references in the literature and letters of inquiry that further elucidation of this problem is in order. This matter is of considerable interest to both male and female patients, as well as the wives of male patients, and may play a large part in deciding what procedure, if any, is to be carried out.

The problem of discussing possible secondary effects of sympathectomy with the patient preoperatively is a difficult one and must be handled judiciously. In general, however, we believe that the patient should know the essential facts and enter into the decision, particularly when the chances of sterility are fairly high. We have not found the psychologic element an important factor in influencing libido and potency from talking preoperatively with patients about this matter, contrary to the experience of Fowler and deTakats.[21] This contention is supported by the findings in the transthoracic group, Tables 3 and 4, a very high percentage of whom had interference with potency, that is, disturbance of erection. The sexual factors were not discussed with this group because no change in sexual function was anticipated, as the sympathetic chain was not removed below the 12th dorsal ganglion on either side in any case (Fig. 1). A possible explanation of this unexpected finding will be mentioned later.

The accompanying figures, tables and diagrams summarize the information obtained from the questionnaire submitted to each patient.

Certain questions were designed so that the results for the group as a whole could be compared with the results in those who had disturbance of sexual function. That is, did those who had changes in sexual function think that the operation was not worth while because of this effect? Slightly over 85 per cent of the group as a whole stated that they considered the operation worth while, whereas approximately 75 per cent of those who noted change in sexual function were of the same opinion. This may not be entirely the result of the effect

TABLE 3. *Evaluation of Results According to Type of Operation.*

	TRANSTHORACIC — 19 CASES (D1 OR D2 THROUGH D11 OR D12 + SPLANCHNICECTOMY, BILATERAL)		LUMBODORSAL — 116 CASES (D7, 8 OR 9 THROUGH D12, L1, L2 OR L3 + SPLANCHNICECTOMY, BILATERAL)		LUMBAR — 23 CASES UNILATERAL, 12; BILATERAL, 11 (ALL COMBINATIONS)	
	no. of cases	*percentage*	*no. of cases*	*percentage*	*no. of cases*	*percentage*
Symptoms improved	18	95.0	104	90.0	16	69.0
Operation worth while (subjective)	17	89.5	100	86.8	17	74.0
Disturbance of erection	11	57.0	26	23.0	9	39.0
Permanent loss of ejaculation	0	0.0	24	21.0	6	26.0
Temporary loss of ejaculation	5	26.0	8	6.9	1	4.3
Significant change of sexual function	9	47.0	28	24.0	8	34.8
Operation worth while	7	77.7	21	75.0	6	75.0

TABLE 4. *Analysis of Results According to Ganglia Removed.*

	TRANSTHORACIC — 19 CASES			TOTAL	PEET — 3 CASES
	D1 THROUGH D11–12, BILATERAL	D2 THROUGH D11–12, BILATERAL	D1 THROUGH D8–10, BILATERAL		D8–D12, BILATERAL
Number of cases	9	7	3	19	3
Sexual function decreased (patient's estimate)	4–44%	5–71%	2–67%	11–57%	0
Disturbance of erection	4–44%	5–71%	2–67%	11–57%	0
Permanent loss of ejaculation	0	0	0	0	0
Significant change of sexual function	4–44%	3–42%	2–67%	9–47%	0

on sexual function for those who noted such change, but, having discussed this matter personally with a number of patients, we know that this factor was an important one in a few.

Other questions were included because it was anticipated that some knowledge of the status of the wife and number of pregnancies before and after operation might assist in evaluating this matter. We have tabulated the results of these questions, but they are not pertinent to the present discussion.

The findings as given by the patients on the questionnaires have been listed, and we have inserted one other item, — *significant change in sexual function.* This was computed by us from a combination of various questions. Examples are as follows: If a patient stated that sexual function had been altered as the result of a slight disturbance of erection but he had intercourse as frequently as before operation and ejaculation was normal, we would consider this as *not significant.* If the disturbance in erection had been moderate or great, or if ejaculation had been lost, it was then tabulated as *a significant change.*

Table 1 shows the general distribution of the operative procedures from which these results were taken. Two hundred and sixty-five questionnaires were sent and 183, or 69 per cent, were returned. There was no selection of cases. One hundred and sixteen were lumbodorsal splanchnicectomy, 23 were lumbar sympathectomy, 19 were transthoracic sympathectomy and splanchnicectomy and 3 upper-dorsal sympathectomy, making a total of 161 cases analyzed. Seventeen questionnaires were returned without names, hence being of no value, and 5 were discarded because of factors that make evaluation impossible.

The composite breakdown of the questionnaire answers, giving the results following all types of operations, is summarized in Table 2. Most of these results are self-explanatory. It is interesting to note that 7.0 per cent stated that sexual function had increased. It will be noted that those showing decrease of sexual function were grouped in decades according to age. Kinsey[24] has studied this matter extensively in the male; he states that "potency begins to diminish in the male from earliest childhood, at least from the age of 7. In actual performance the male activity begins to demise from about age 16. We find no point of more rapid diminution appearing in middle life or old age." Hence, it appears that the changes in potency may be coincidental with the natural processes of aging. However, in our opinion, they are more likely secondary to the operative procedure. Loss of ejaculation must be regarded purely as an operative effect.

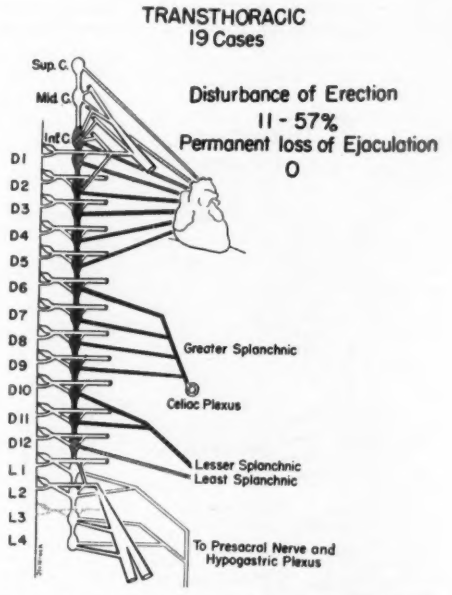


FIGURE 1. *Blacked-out Portions Represent Ganglia Removed in Each of the Transthoracic Cases. The Ganglia Containing Diagonal Lines Were Also Removed in a Few Cases. (See Tables 3 and 4 for More Detailed Analysis of Results.)*

Tables 3 and 4 and Figure 2 summarize the data of the 116 cases in the lumbodorsal group. The first set of lumbar rami, or the ganglion, as judged by the surgeon, was interfered with on one or both sides in 68 of these. In only two cases was D_{12} on one side and L_1 on the other side removed. These, with the three cases of bilateral removal through D_{12} (the Peet maneuver), making a total of 5, had

TABLE 4 (*Concluded*).

LUMBODORSAL — L_1 — 68 CASES			LUMBODORSAL — L_4 — 44 CASES			LUMBAR — 23 CASES	
D_7, 8 OR 9 TO D_{12}— ONE SIDE, L_1— OTHER SIDE	D_7, 8 OR 9— L_1, BILATERAL	TOTAL	D_7, 8 OR 9 TO L_1,— ONE SIDE, L_2— OTHER SIDE	D_7, 8 OR 9 TO L_2, BILATERAL	TOTAL	UNILATERAL L_1–L_2	BILATERAL ALL COMBINATIONS
2	66	68	36	8	44	12	11
0-0%	28-42%	28-41.2%	13-36.0%	4-50.0%	17-38.6%	4-33.0%	9-80.0%
0-0%	18-27%	18-26.4%	6-16.6%	2-25.0%	8-18.0%	2-17.0%	7-63.0%
0-0%	10-15%	10-14.5%	10-28.0%	3-37.5%	13-29.3%	0	6-54.0%
0-0%	13-19.7%	13-19.4%	11-30.0%	3-37.5%	14-31.8%	1-8.0%	7-63.6%

no change in sexual function. However, when L_1 was removed on both sides, as was done in 66 of these cases, 18, or 27 per cent, had disturbance of erection and 10 or 15 per cent had permanent loss of ejaculation. It was believed that 13, or 19.7 per cent, had *significant* change of sexual function.

Table 4 shows 44 cases of the lumbodorsal group in which L_2 was removed on *one* or *both* sides. Thirty-six of these had L_1 on one side and L_2 on the other removed. Of these 6, or 16 per cent, had a disturbance of erection and 10, or 28 per cent, had permanent loss of ejaculation, with a *significant* change in sexual function in 11 cases, or 30 per cent. This makes about an over-all 10 per cent greater change than in the L_1 group.

When L_2 was removed on *both* sides, it will be seen that the change was only moderately greater, 37.5 per cent having a significant change in sexual function. In the entire group of lumbodorsal cases, the operation was considered worth while by 86.8 per cent, whereas of the group that had significant change of sexual function 75 per cent considered the operation to have been worth while. That the change of sexual function played a part in this difference is extremely likely.

Tables 3 and 4 and Figure 3 show the 23 lumbar cases, divided into unilateral and bilateral procedures. The striking factor in the 12 unilateral cases is that 4 of the patients considered their sexual function decreased after operation and 2 had disturbance of erection, 1 significantly so. Loss of ejaculation was not noted in any unilateral cases. Unilateral lumbar sympathectomy is generally thought to be followed by no changes of sexual function.

Of the bilateral group, in which various combinations of ganglia were removed, the change is much greater, 63 per cent of these patients having significant change of their sexual function. All this group had L_1 removed on one or both sides, with the exception of one patient who had L_2 and L_3 only removed bilaterally and had no change in sexual function. Hamlin, Warren and Kennard[28] mentioned two cases in which only L_2 and L_3 were removed on both sides without change in sexual function.

It is interesting to note the cases in which L_1 and L_2 were removed bilaterally from above, including a portion of the dorsal chain and the splanchnic nerves in the lumbodorsal operation (Table 4). Of these patients, only 37.5 per cent had a significant

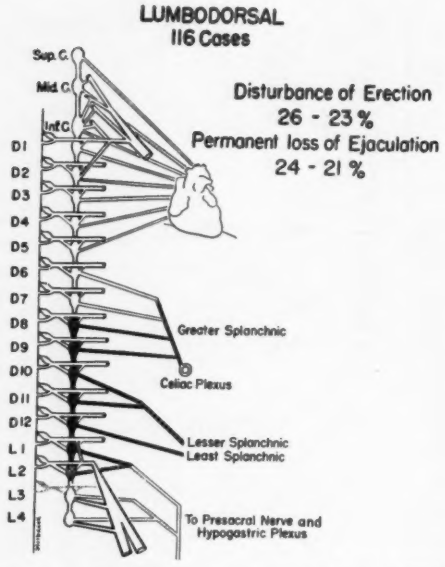


FIGURE 2. *Blacked-out Portions Represent Ganglia Removed in Each of the Lumbodorsal Cases. The Ganglion Containing Diagonal Lines Was Removed in a Few Cases. The Figures in This Diagram Refer to the Entire Group of Lumbodorsal Cases. (See Table 4 for More Detailed Analysis of Results.)*

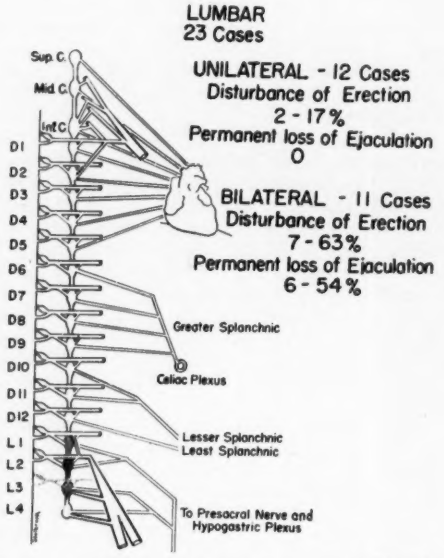


FIGURE 3. *Blacked-out Portion Represents the Ganglion Removed in Each of the Lumbar Cases. The Ganglia Containing Diagonal Lines Were Also Removed in Various Cases. (See Tables 3 and 4 for More Detailed Analysis.)*

change in sexual function. Hence it is seen that in certain cases, at least, L_2 and L_3 can be removed bilaterally and in others L_1 and L_2 can be removed bilaterally without interfering with the sexual mechanism. This would lead one to the inescapable conclusion that the outflow from L_1, and possibly above, is of major importance in this respect in certain cases when L_2 is removed with L_3 and the outflow from L_3 is of similar importance when L_2 is removed with L_1.

Several observers have pointed out the great anatomic variation of the sympathetic system and, particularly, of ganglia in the lumbar area. Figure 4 is a conventional drawing of the lower lumbar and sacral region. This is, of course, diagrammatic and shows the ganglia arranged symmetrically on both sides. The connections with the

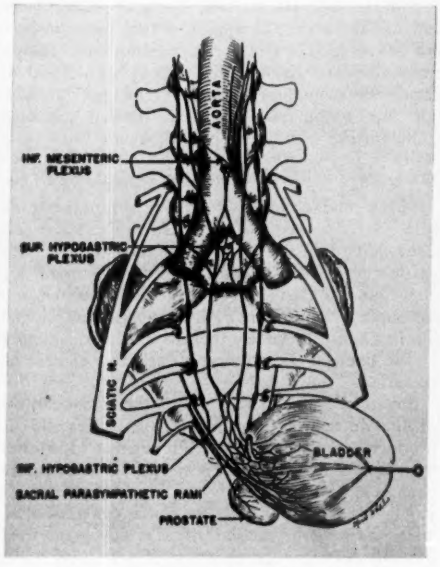


FIGURE 4. *The Inferior Mesenteric and Hypogastric Plexuses. (Reproduced from White and Smithwick,[15] by Permission of the Publisher.)*

superior hypogastric plexus or presacral nerve leading to the vesicle plesuses where there is a close association with the parasympathetic outflow from the second to the fourth sacral rami will be noted. Such an anatomic arrangement, as depicted in this diagrammatic representation, is very seldom encountered at operation, as has been pointed out by Yeager and Cowley,[25] Atlas,[26] Livingston[27] and Lowenberg.[28] All surgeons operating in this region are well aware of the great difficulty of exact identification of ganglia. We believe that the rami can be identified with considerable exactitude. However, the cell bodies of the various axones making up the rami are unpredictable in their location. The existence of cross-connections from one chain to the other is well known and should be re-emphasized, particularly when one is seeking to explain certain phenomena that follow unilateral sympathectomy. Also, as will be seen from Yeager and Cowley's drawings (Fig. 5 and 6), the find-

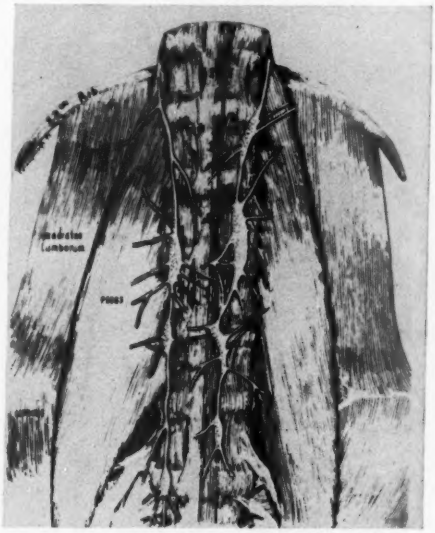


FIGURE 5. *Rami Radiate in All Directions; Communicating Rami from 2nd Ganglion on Left Fuses with Common Trunk. Note Well Defined Communication between Right and Left Trunks, at the Level of the 3rd and 4th Intervertebral Substance. This Is Not an Unusual Occurrence. (Reproduced from Yeager and Cowley,[25] by Permission of the Publisher.)*

ings on one side will not necessarily be duplicated on the other side. This anatomic variation from patient to patient is also one of the obvious explanations for the finding that, for instance, only 19.7 per cent of the patients in whom a lumbodorsal procedure was carried out through L_1 bilaterally have significant change in sexual function. Otherwise, one would expect exactly the same result from patient to patient; that is, the sexual function should be disturbed in either 0 per cent or 100 per cent. The presence of sympathetic ganglia in the communicating rami, as recently described by Skoog,[29] may also be responsible for the variable effects.

Because of the interest of a considerable number of female patients concerning possible effects of

operation on later sexual function and also on childbearing, we questioned a group of twenty unselected females two to nine years after lumbodorsal splanchnicectomy. Fowler and deTakats[21] stated: "Sympathectomy has no adverse effect on the female genital tract, since many records are available of women who, contrary to our advice, have become pregnant and have borne normal children." Pregnancy's having ensued does not necessarily, of course, imply that there had been no effect on sexual function. That pregnancy can occur after bilateral sympathectomy and splanchnicectomy is well known.

FIGURE 6. *No Ganglion Overlying L_1 on Either Side; No Ganglion Below the Level of L_3 on the Left. (Reproduced from Yeager and Cowley,[31] by Permission of the Publisher.)*

We have operated on a number of young women who had made previous unsuccessful attempts to bear a living child because of high blood-pressure levels or complications thereof. After undergoing bilateral lumbodorsal splanchnicectomy, a high percentage of these women have been able to give birth to normal children.[30] In patients who do not have a highly favorable response to operation, pregnancy is contraindicated. Occasionally sterilization may be advisable.

Concerning other aspects of sexual function in the female we obtained somewhat equivocal results, the psychogenic and coincidental age factors probably playing a large part. Of 16 of the 20 women questioned who were having menses prior to operation, 4 noted change in the cycle postoperatively. Two had irregular intervals between periods preoperatively; one of these stopped flowing altogether and the periods of the other became more regular after operation. Another, 47 years old, who had been having regular menses prior to operation, stopped menstruating completely after operation. The fourth noted that the interval between periods increased from twenty-eight days to two months. Of the 4 women whose menses had ceased preoperatively, 3 noted no change and 1 stated that she had fewer hot flashes and felt better immediately after operation. In respect to intercourse, questions were asked concerning difference in frequency, desire and sensory component in the preoperative and postoperative periods. Two of the 20 women questioned stated that desire and frequency were less and two noted lessened sensory response. One of the 20 believed that she definitely felt more desire after operation. We are inclined to agree with Fowler and deTakats that change in sexual function need not be regarded as a factor in deciding for or against sympathectomy in women. Apparently there are certain occasional postoperative changes, probably not due to interference with normal anatomic configuration during the operation.

Discussion

The secondary effects following sympathectomy, particularly as regards sexual function, have been somewhat difficult to explain satisfactorily. Investigation after sympathectomy in animals and man has resulted in certain definite conclusions concerning anatomic pathways and physiologic mechanisms. However, there is still a considerable hiatus between experimental data and clinical observation.

Simeone[31] showed that sympathetic denervation of the ductus epididymis in guinea pigs did not produce complete paralysis but seemed to interfere with the normal peristaltic activity. It was suggested that spermatozoa might lose their fertilizing capacity because of stagnation of the contents of the epididymis. Obstruction of the ductus deferens did not lead to degeneration of testicular parenchyma.

Semans and Langworthy,[32] using cats as experimental animals, pointed out that ejaculation, as used commonly, denotes two distinct actions. The first, emission, is the sudden contraction of the smooth muscle of the internal genital organs, which delivers semen into the urethra. The second, ejaculation in the restricted sense, is the expulsion of seminal fluid from the urethra by contraction of the bulbocavernosus (skeletal) muscle. The process is basically a reflex phenomenon. The afferent impulses arise chiefly in the sense organs of the glans and are transmitted by the internal pudendal nerves to the spinal cord. Efferent impulses leave the upper lumbar segments of the spinal cord and travel over

the lumbar rami communicantes and hypogastric nerves through the hypogastric plexus and evoke emission. The impulses that elicit ejaculation are parasympathetic and travel over the internal pudendal nerves. Semans and Langworthy considered that an ejaculatory center in the lumbosacral spinal cord integrates the reflexes.

Learmonth[33] (Fig. 7) described the anatomy of the presacral nerve. He found that the superior hypogastric plexus, or presacral nerve, receives nerve supply from the lumbar chain, semilunar ganglia and possibly the preaortic plexus. This seems to be of considerable importance in explaining preservation of sexual function after complete lumbar sympathectomy. Also, after removal of L_2 and L_3 the large connection from L_1 would play a major role in maintaining connections in the presacral nerve. Langley and Anderson[34] found that section of the sacral nerves and study by degeneration experiments show that the majority of the nerve strands run to the rectum and bladder, — fewer to the urethra and vulva but none to the internal generative organs, uterus and vagina. Sacral nerves send no efferent fibers to the internal generative organs. Learmonth[33] showed that electrical stimulation of the hypogastric nerves produced contraction of the internal sphincter as well as contraction of the musculature of the seminal vesicles and ejaculatory ducts. After division of the sacral nerve, the internal sphincter became much more relaxed. It was found that after twenty days relaxed sphincters may regain their tone, although not completely. The internal sphincter probably possesses an inherent tonus of its own. Learmonth concluded that maintenance of closure of the internal sphincter depended on its inherent tonus, which in turn depended upon the integrity of reflex fibers in the parasympathetic pathway, and that its sympathetic supply mainly reinforced the closure. Denny-Brown and Robertson[35] studied the mechanism of the bladder sphincter. They found that the external sphincter appeared to maintain tonic contraction subject to relaxation of the internal sphincter or contraction of the bladder.

In discussing the mechanism of erection, Hooker[36] states that dilatation of the penile arteries and erection are induced by stimulation of the pelvic splanchnic nerves, whence their name — nervi erigentes. Passive compression of the penile veins and retardation of the venous outflow is thought to occur. Working with dogs, Henderson and Roepke[37] presented evidence to show that erection is not due to compression of the efferent veins by skeletal muscle action. Semans and Langworthy[32] found that stimulation of the sympathetic nerve supply results in constriction of the arteries of the penis and subsidence of erection. They found that a center for reflex erection apparently exists in the sacral spinal cord of cats, as shown by stimulation of the glans eliciting erection only when the pudendal nerve is intact. Psychic stimulation will produce erection after destruction of the sacral cord but not after destruction of the lumbar cord. Hence, it would seem that erection is purely a parasympathetic phenomenon, whereas ejaculation is a combination of parasympathetic and sympathetic reactions. The following diagrams represent the way in which these phenomena are thought to occur.

In seeking to account for the changes in sexual function noted after various types of sympathectomy, we have invoked three well known physiologic mechanisms as a means of possible explanation of the disturbances of erection. The process of ejaculation and disturbances thereof following sympathectomy are fairly well understood; they are summarized below. In accounting for disturbances of erection after various operations, all three mechanisms to be mentioned may work together in certain instances and only one or two may function in other cases, according to the area denervated. The deductions that follow imply that certain aspects of the experimental work carried out in animals is applicable to man. Further investigations may reveal other findings that will

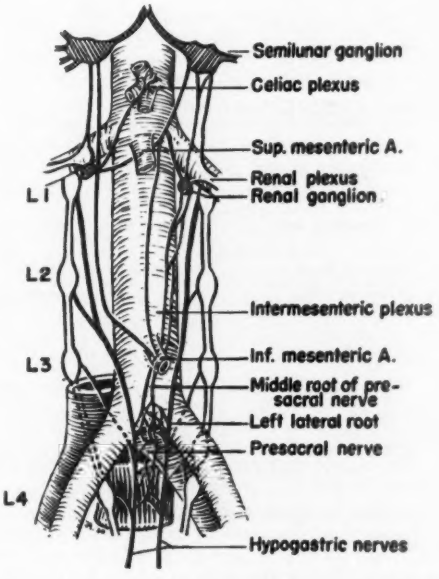
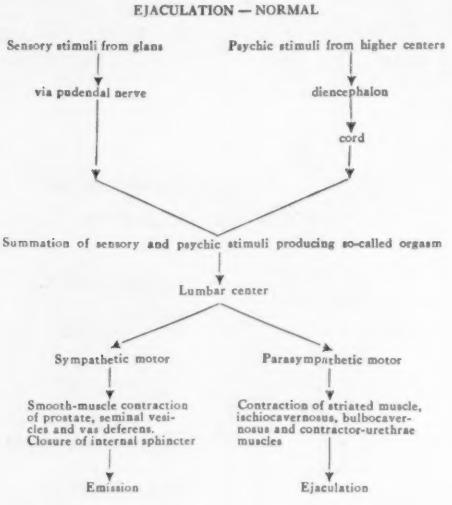


FIGURE 7. *Components of Presacral Nerve and Hypogastric Plexus. (Redrawn from Learmonth,[33] by Permission of the Publisher.)*

supplant these theories entirely or transplant them from the realm of speculation to that of fact.

We will consider ejaculation first. The following diagram probably represents the sequence of events in the normal or unoperated male as generally accepted at present.


EJACULATION — NORMAL
Sensory stimuli from glans
Psychic stimuli from higher centers
via pudendal nerve
diencephalon
cord
Summation of sensory and psychic stimuli producing so-called orgasm
Lumbar center
Sympathetic motor
Parasympathetic motor
Smooth-muscle contraction of prostate, seminal vesicles and vas deferens. Closure of internal sphincter
Contraction of striated muscle, ischiocavernosus, bulbocavernosus and contractor-urethrae muscles
Emission
Ejaculation

Ejaculation

Normal. Three separate mechanisms explain the normal process of ejaculation:

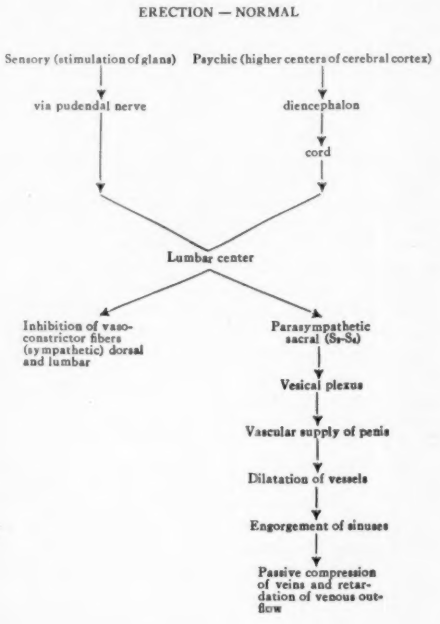
1. The parasympathetic outflow, S_2-S_4, controls the spasmodic contraction of the ischiocavernosus, the bulbocavernosus and the constrictor urethrae muscles. This is the main expulsive force of the ejaculate. 2. The sympathetic fibers innervate the smooth muscle of the prostate and seminal vesicles and vas deferens. 3. The contraction of the internal sphincter muscle is partially by way of the sympathetic fibers, and contraction occurs when ejaculation is initiated. The sympathetic fibers to the penile vessels are stimulated at the same time; vasoconstriction occurs, contraction of the muscles forces blood out of the corpora and erection is lost. There is ample experimental evidence to support all three contentions.

After sympathectomy. The explanation of what happens when operative procedures on the sympathetic nervous system interfere with so-called ejaculation is as follows:

The ejaculatory process itself is not interfered with at all, but ejection of the fluid through the penile meatus does not occur. The parasympathetic function is unaltered. There are fewer spermatozoa, and those that are present are not motile due to lack of peristalsis of the vas deferens. Less seminal fluid is expelled into the prostatic urethra between the external and internal sphincter because of interference with smooth-muscle contraction of the prostate and seminal vesicles. What emission is present enters the bladder instead of being propelled to the penile meatus, as the internal sphincter is relaxed. Entry into the bladder is the path of least resistance. A small portion may travel the normal course as the internal sphincter regains some of its tone.

Erection

The anatomic pathways and physiologic mechanisms of normal erection are well understood as a result of previously mentioned experimental work in animals and man. The sequence of events is as illustrated in the diagram above; it is almost wholly parasympathetic through the sacral outflow, S_2 to S_4 inclusive, which brings about dilatation of arterial inflow to the penis, with resultant engorgement of the sinuses and passive decrease of venous outflow. The sympathetic role is a secondary one of reflex inhibition that would prevent vasoconstrictor impulses from reaching the penile vessels.



After sympathectomy, the three possibilities that may explain partial or total failure of erection are as follows:

1. Increased sympathetic activity over the presacral plexus as a result of removing portions of the sympathetic system above theganglia that give origin to fibers connecting with the presacral plexus. This would hold true particularly in thoracic sympathectomies in which the entire upper portion of the body is denervated. Increased tonus of the remaining sympathetic system in the lower portion of the body would mean that vasoconstrictor impulses to the penile vessels would be increased and hence would interfere with erection.

2. The "borrowing-lending" phenomenon (hemometakinesia), as emphasized by DeBakey, Burch, Ray and Ochsner[38] would be another mechanism contributing to difficulty in erection when sympathetic ganglia are removed in the upper portion of the body. The vasodilatation produced would divert available blood in large proportions to the denervated areas and hence make less blood available to the areas of the body in which the sympathetic system was intact. This would, in effect, shunt blood away from the pelvic viscera, interfering with erection.

3. After sympathetic preganglionic and postganglionic fiber degeneration there is sensitization to circulating adrenin, as has been clearly demonstrated.[17] This phenomenon is more of a factor in postganglionic fiber degeneration but occurs also to a lesser extent when preganglionic fibers are divided. Hence, when ganglia that give origin to fibers supplying the pelvic viscera are removed sensitization to circulating adrenin occurs, bringing about increased vasoconstriction of the penile vessels and thereby interfering with erection. We believe that this mechanism is very likely the one that is in effect in cases of disturbance of erection following lumbar sympathectomy.

The first two factors would obviously not play a role in cases in which the first, second and third lumbar ganglia on both sides were removed. After transthoracic and lumbodorsal splanchnicectomy all three mechanisms may play a part. In the transthoracic and lumbar cases the adrenal glands are not completely denervated. More postganglionic fibers would be interfered with in the lumbar sympathectomies than in the transthoracic or lumbodorsal type.

Conclusions

The likelihood of interference with the various phases of sexual function after sympathectomies of different types has been enumerated and discussed.

In the transthoracic procedure, in which the operation is extended to D_1 or D_2, to include the sympathetic denervation of the heart, there was no permanent loss of ejaculation, but a disturbance of erection occurred in 57 per cent of the cases. This was not complete and did not seriously interfere with sexual intercourse.

In the lumbodorsal operation, it is our impression that all phases of sexual function can be preserved by modifying the operation, if necessary, and not removing any ganglion below L_1 on one side and D_{12} on the other, as shown in 5 cases of the reported series. This is occasionally of importance to the young male adult.

In the bilateral lumbar procedure there will be no interference with sexual function if the operation is not extended to include L_1 on either side. However, only 3 patients were found to have been operated on in this way, and, as was pointed out, the first lumbar ganglion may be difficult to identify. It is our experience in cases in which removal of the lumbar sympathetic chain below L_2 bilaterally will have the desired clinical effect that almost complete assurance can be given that sexual function will not be altered in any respect. On the other hand, when L_1, L_2 and L_3 are removed on both sides significant change in sexual function can be expected in at least 63 per cent of cases. The number of cases in the lumbar group is too small to permit any definite conclusion.

The vast majority of our patients with serious cardiovascular disorders, particularly those who do not plan to have any more children, do not wish to have possible changes of sexual function considered in the decision concerning exactly what ganglia should be removed. We believe that it is wise to apprise the patient of the possibilities in this regard before operation and allow him to make the decision.

The anatomic pathways and physiologic mechanisms involved in erection and ejaculation before operation are outlined, and an attempt is made to clarify the manner in which these functions are interfered with after various types of sympathectomy.

The selection of the proper operation for the individual patient is discussed in the light of possible secondary effects of sympathectomy. As illustrated by the high incidence of favorable evaluation of the various operative procedures by the patients themselves, many of the secondary effects following sympathectomy will be well tolerated.

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UTILIZATION OF SERVICES IN A MEDICAL GROUP PRACTICING PREPAID MEDICINE*

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THE PURPOSE of this communication is to report the utilization of physician services by insured persons who have received comprehensive medical care as members of the Central Medical Group of Brooklyn. The statistics cover a period of one year — from July 1, 1949, to July 1, 1950. This period represents the third year of the Group's operation, the first patients having been enrolled in March, 1947.

It is our opinion that the publication of these statistics should be of general interest because of the rapid growth of prepaid medicine and because this report will enable physicians to learn what occurs when group medicine is practiced in combination with a voluntary health-insurance program. A study of these data will offer the opportunity to evaluate the extent and type of services that are required by a panel of approximately 25,000 insured persons. These patients are composed of those persons who have been enrolled by the Health Insurance Plan of Greater New York and who have chosen the Central Medical Group to serve them.

Under their contracts, the group patients received an almost unlimited amount of service in the home, the physician's office and the hospital. Indeed, subscribers were urged repeatedly to visit their physicians regularly and to take advantage of the Group's preventive medical program.[1] Stress was laid on the advantages of seeking medical advice early in an illness, and the participating physicians sought consultations and used laboratory and x-ray facilities as frequently as they desired. The only exclusions were for cosmetic surgery, long-term psychotherapy, treatment of tuberculosis when sanatorium care was required, drug addiction and chronic alcoholism.

Scrutiny of the following data may help to clarify many of the questions that have been asked concerning comprehensive, no-fee-for-service medical insurance. It has been the belief of a large portion of the medical profession that an all-inclusive plan such as this would fail to succeed because of overutilization of services by malingerers and neurotic patients. They have predicted that abolition of fees-for-service would be accompanied by inordinate demands for home visits and innumerable requests for unnecessary x-ray examinations and laboratory tests. The following data will reveal, however, that utilization of services has not been excessive and that patients do not abuse a health plan after they have been educated to its use. Careful and scientific actuarial studies conducted for a period of two years before the commencement of this health-insurance program led highly trained investigators

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to calculate that the rate of utilization would be somewhere between 6 and 7 physician services per enrollee per year.

The Group's patients consist of a fairly good cross-section of the general population of the city, although there is a greater proportion of children, — 26.7 per cent of the subscribers being under 15 years of age, — and consequently a somewhat younger average age than one would expect to find (Table 1). These findings are attributable to the fact that the majority of enrollment stems from family contracts in which many children are included and also to the fact that almost all subscribers are gainfully employed and therefore tend to be in younger age groups. Less than 1.6 per cent of the Group's insured persons are over 65 years of age. The Health Insurance Plan, as an insurance organization and enrolling agent, has followed strict underwriting rules under which 75 per cent of any eligible group of prospective subscribers must join before that group is accepted. This results in a representative sample of the healthy and ill in the population and makes reasonable utilization possible, which would not be true if adverse selection in the enrollment of subscribers was permitted.

Table 2 shows that 144,405 medical services were rendered to the Group's 25,109 insured persons during the twelve-month period studied. *This represents 5.75 services per insured person per year.* This rate is slightly higher than the preceding year, in which the Group gave 5.3 physician services per enrollee. Although such an increase is not statis-

TABLE 1. *Enrollment According to Age Group.**

AGE	PERCENTAGE OF TOTAL
yr.	
Birth–5	8.0
6–9	10.4
10–14	8.3
15–19	5.1
20–24	2.6
25–29	6.1
30–34	8.1
35–39	11.2
40–44	13.3
45–49	9.6
50–54	7.2
55–59	4.4
60–64	2.4
65–69	1.3
70–and over	0.3
Age unknown	1.7
Total	100.0

*Compiled by the Statistical Department, Health Insurance Plan.

TABLE 2. *Utilization of Physician Services, July 1, 1949–July 1, 1950.**

PHYSICIAN	OFFICE SERVICES	HOME DAY VISITS	HOME NIGHT OR WEEK-END VISITS (OR BOTH)	HOSPITAL SERVICES	TOTAL SERVICES PER PHYSICIAN
General Physician					
"A"	3521	557	270	69	4417
"B"	4018	525	334	381	5258
"C"	3937	645	375	129	5086
"D"	4616	939	300	142	5997
"E"	3653	810	114	383	4960
"F"	3041	513	331	137	4022
"G"	2721	383	272	22	3398
"H"	4508	850	245	22	5665
"I"	3353	961	318	141	4773
"J"	3728	657	285	157	4827
Pediatrician					
"A"	2574	1368	2	727	4671
"B"	2274	1462	323	559	4618
"C"	2179	1436	294	211	4120
"D"	1542	1455	273	221	3491
"E"	2113	1810	377	309	4609
Surgeon					
"A"	2300	—	—	3854	6154
"B"	2491	60	—	3639	6190
Otolaryngologist					
"A"	3247	11	—	354	3612
"B"	1868	6	—	162	2036
Obstetrician-gynecologist					
"A"	2072	1	—	3578	5651
"B"	2486	5	—	3082	5573
"C"	1203	9	—	2333	3545
Orthopedist					
"A"	1213	—	—	367	1580
"B"	2129	12	—	356	2497
Ophthalmologist	5013	2	—	110	5125
Urologist					
"A"	1903	7	—	539	2449
"B"	—	—	—	153	153
Neuropsychiatrist	660	5	—	64	729
Dermatologist	2928	—	—	15	2943
Allergist	5968	—	—	7	5975
Internist					
"A"	2056	17	—	2783	4856
"B"	1197	16	—	3247	4460
Radiologist	5286	—	—	—	5286
Pathologist	5679	—	—	—	5679
Totals	97,477	14,562	4113	28,253	144,405

*Mean enrollment	25,109
Office visits	67.5% of total services
Home visits	13.0% of total services
Hospital visits	19.5% of total services
Utilization rate	5.75 physician services per enrollee per year

tically too significant, it does indicate that the Group's health-education program has been successful in persuading its members to seek medical advice more frequently.

The work was performed by 34 physicians, 30 of whom are partners in the Group and 4 of whom are under contract agreements to it. There are 10 general physicians and 5 pediatricians, all of whom are on a so-called full-time basis. Two general surgeons, 1 otolaryngologist, 2 obstetrician-gynecologists, 1 ophthalmologist and 2 internists serve as full-time partners; 1 otolaryngologist, 1 obstetrician, 2 orthopedists, 2 urologists, 1 neuropsychiatrist, 1 dermatologist, 1 allergist, 1 radiologist, and a pathologist serve on a part-time basis. "Full-time,"

TABLE 3. *Average Monthly Enrollment and Utilization of Services.*

MONTH	MEAN ENROLLMENT	NO. OF SERVICES RENDERED
July 1949	24,759	8,038
August 1949	24,883	8,882
September 1949	24,865	10,524
October 1949	25,041	11,108
November 1949	25,243	11,840
December 1949	25,446	12,187
January 1950	25,509	12,099
February 1950	25,306	12,391
March 1950	25,098	16,598
April 1950	25,050	13,425
May 1950	25,071	13,691
June 1950	25,041	13,622

in the experience of the Group, means a minimum of forty hours a week spent in treating patients or doing other Group work. In order to give efficient service to its patients and to prevent overwork by its participating physicians, the Group tries at all times to maintain a ratio of 1 physician for every 800 insured persons. During the year herein reported, the Group numbered 23 full-time physicians and 11 who functioned in varying degrees on a part-time basis. It can be estimated that these 34 men gave an amount of time equivalent to that of about 30 or 31 full-time physicians. Despite the classification as "full-time," all the Group's personnel found extra time to treat non-insured patients, as private physicians.

It is shown in Table 2 that 67.5 per cent of all services were office visits, 13 per cent were home visits and 19.5 per cent were hospital visits. These figures tend to show that insured patients do not, on the whole, take unfair advantage of a prepaid medical plan by requesting an excessive number of home calls, as the incidence of home visits is far below that obtaining in ordinary medical practice. Rappleye[2] reported that approximately 1 of 3 medical services in the United States was rendered by general physicians in the patient's homes, whereas in the Central Medical Group only 1 of 5 general physician services is a home visit.

Another interesting finding is the relatively high incidence of hospital services, namely, 19.5 per cent.* This can be explained for the most part by the fact that Group patients are also covered by hospital insurance and therefore when hospitalization is advised consent more readily than those who possess no such coverage.

As in all medical practice, there was a marked seasonal variation in the quantity of medical work. Table 3 shows a range from a low of 8038 physician services in the month of July to a high of 16,598 services during March. The average for the year lay in between these two figures, that is, at approximately 12,000 services per month. As the Group has accumulated experience, its administrators have learned to predict with fair accuracy the work load in each specialty during any one period of the year. Thus, physicians remain on duty during those months when the load is heavy in their department, and their vacations (four weeks per year) are taken during slack periods.

Of the 144,405 physician services (Table 4), 48,403, or 33.5 per cent, were rendered by general

TABLE 4. *Division of Services by Department.**

DEPARTMENT	NO. OF PHYSICIANS IN EACH DEPARTMENT	NO. OF SERVICES RENDERED	PERCENTAGE OF TOTAL SERVICES
General practice	10	48,403	33.5
Pediatrics	5	21,509	14.9
General surgery	2	12,344	8.6
Obstetrics-gynecology	3	14,769	10.2
Internal medicine	2	9,316	6.5
Allergy	1	5,975	4.1
Ophthalmology	1	5,125	3.6
Otolaryngology	2	5,648	3.9
Orthopedics	2	4,077	2.8
Dermatology	1	2,943	2.0
Urology	2	2,602	1.8
Neuropsychiatry	1	729	0.5
Radiology	1	5,286	3.7
Pathology	1	5,679	3.9
Totals	34	144,405	100.0
*Obstetrical deliveries			275
Major operations (all surgical specialties)			416
Minor operations (all surgical specialties)			2,630

physicians, 21,509, or 14.9 per cent, were contributed by pediatricians and 74,493, or 51.6 per cent, were given by all other specialists. Since almost all first contacts of patients were with their general physicians or pediatricians, it is to be expected that these physicians would render the greatest number of services. Despite this fact, the exceptionally high percentage of the total work load (51.6 per cent) performed by the specialists is noteworthy. This is a natural result of the methods used in group practice, whereby the general practitioners and pediatricians refer a large proportion of their patients to the specialist. Thus, the sacroiliac

*Ginzberg[3] reports that in New York City 137 persons per 1000 population are hospitalized each year for a period of 9.1 days in semiprivate accommodations of voluntary hospitals. This would mean approximately 24,342 hospital services rendered each year to a group of 25,000 patients. The 25,000 enrollees of the Central Medical Group received 28,253 hospital services during the course of one year.

sprain is cared for by the orthopedist rather than the family physician, and the child's eczema is treated by the dermatologist or allergist rather than by the pediatrician. This practice alleviates considerably the heavy load of the pediatrician and general physician and at the same time results in more expert care for the Group patient.

Table 4 lists the percentage of the total work performed by each department. Any direct contact between physician and patient is recorded as a service, whether it was an office visit for a mild upper-respiratory infection or a major operative procedure. After much deliberation, the Group decided that it was not feasible to differentiate statistically the various kinds of medical service rendered. It is necessary, therefore, in interpreting Table 4, to bear in mind the type of work that each physician performs. In addition to the physician services, several thousand nurse and technician services have been performed that do not appear in the accompanying charts. Such procedures as diathermy, massage, ultraviolet and infra-red treatments, basal-metabolism tests, electrocardiography and penicillin injections have been omitted from consideration in this report because they do not require the presence and actual participation of physicians. Pathological services have been computed according to the number of patients seen, not by the number of tests performed. In the same manner, radiologic services have been calculated according to the number of patients who have had roentgenograms or been given radiation therapy, not by the number of films made.

Certain facts shown in Table 4 merit some explanation. For instance, the large number of services recorded by each of the general surgeons is partially due to their custom of operating on patients as a team. Since each surgeon makes his own record of these services, the surgeons' total figures are somewhat higher. Similarly, the high percentage of the total work load reported by the Obstetrical Department can be attributed in part to its practice of having two obstetricians make daily visits to the same patient. The internists saw only those patients who were referred by the general physicians or specialists. In the main, their work consisted of caring for those patients whose diagnosis or therapeutic indications presented a serious problem. The large number of services recorded by the allergist can be explained by the fact that he did all the testing and gave all therapeutic injections himself, without the aid of a technician. Since psychotherapy was not included in the subscriber's contract, the psychiatrist had less work to do than one might expect to find. His role was largely that of diagnostician; most of his time was spent in determining whether or not active psychotherapy was necessary.

Conclusions

The utilization of physician services by a panel of 25,000 insured persons is reported.

The utilization rate averaged 5.75 services per enrollee per year.

It is concluded that under a well organized system of medical group practice and comprehensive no-fee-for-service health insurance good medical care can be provided without exploitation of physicians by over-utilization.

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THE MARSUPIALIZATION OPERATION FOR PILONIDAL SINUS*

A Comparison with Other Surgical Methods in 359 Cases

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BOSTON

THE LARGE number of papers written on the surgical management of pilonidal sinus, each usually describing some new or different surgical technic, is eloquent testimony to the fact that results in many cases have been far from satisfactory. Inadequacies of follow-up studies often apparent in these reports, particularly those based on cases treated in the Armed Forces during World War II,[1-3] have made evaluation of various operative procedures difficult. With Armed Forces personnel the follow-up lasted usually only until the patient returned to duty. Our experience has shown that a large percentage of recurrences develop at a later date, although usually within the first year.

Symptomatic pilonidal sinus has been a frequent cause for hospitalization at the Veterans Hospital in West Roxbury, constituting about 9 per cent of all general surgical admissions from January, 1947, to January, 1950, the period covered by this study. This supposedly minor surgical problem, therefore, assumes considerable importance.

In searching for an answer to this problem we began about four years ago to evaluate several accepted surgical operations in cases of pilonidal sinus. A careful application of these technics, with detailed study of their immediate results and the later follow-up, has convinced us that, of the three surgical procedures used, marsupialization afforded the most effective treatment.

Definitive surgical operations were performed on 359 patients with symptomatic pilonidal sinus at this hospital during the three-year period covered by this study. Three hundred and thirty-one of these patients have been followed for an average of nearly two years, the range being between six months and three years. Eighteen per cent of the 359 patients gave a history of definitive surgical treatment elsewhere, and admission was for clinical recurrence. In addition, one third of the remaining patients reported at least one incision and drainage for acute abscess previously, — one had had ten such operations. Thus, more than half of all the patients treated had received prior surgical treatment.

Although the percentage of wounds that remain healed is the most important item in the evaluation of the success of pilonidal-sinus surgery, other considerations have definite bearing on the choice of procedure. The patient, of course, prefers an operation that requires a minimal degree of restriction to the recumbent position, a minimal amount of pain and painful treatments and the briefest hospital stay. He also prefers not to have to return to the Out Patient Department for many dressings or to have to wear dressings or suffer the discomfort of an open wound for any great length of time. He also wishes to have a painless scar and to avoid recurrences.

The Veteran's Administration is interested, in addition to curing the patient and returning him to work, in reducing the economic cost of effective treatment. Improvements such as shortened hospitalization, brief and simple operative procedures and anesthesia and reduction in frequency of dressings and amount of antibiotics given postoperatively will greatly reduce the total cost. The permanence of healing after discharge is of great importance, since recurrences requiring readmission are costly to both patient and hospital.

As has been pointed out by many authors, the chief obstacles to rapid healing after excision of a large pilonidal sinus are the nearly omnipresent infection and the anatomic situation of the sinus over a bony prominence and where immobilization of the wound area is prevented by gluteal-muscle pull from each side.

The surgical procedures used and reviewed in this study were: excision with primary suture, excision by knife or cautery with packing, and marsupialization.

Primary Suture

Excision with primary suture§ may be regarded as an ideal procedure if it is effective. Unless the sinus is exceptionally small the patient may require rest in bed for a period of seven to ten days after a primary suture if the wound is to have a reasonable chance of holding. This period, however, may be worth while if the wound heals primarily and the patient has no recurrence and a comfortable, well healed scar results. A large experience with excision and primary suture has convinced us that this procedure is usually satisfactory for small, clean sinuses. In the larger, chronically infected or otherwise complicated sinuses the observed 13 per cent rate of initial breakdown and infection in the hospital is unsatisfactorily high. The incidence of recurrence after leaving the hospital in patients with appar-

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§Buried-silk-suture technic in nearly all cases.

ently healed wounds was also rather high, being 27 per cent — a net total of 37 per cent of failures for the primary-closure operation. The technic of excision with primary suture that we adapted from Holman[3] to our own needs has been followed, with variations from Holman's technic in only two respects: We omitted the local application of antibacterial agents to the wound surfaces, believing that these substances might be more irritating than bactericidal. We also substituted black-silk buried-suture technic for catgut in the gluteal fascial flaps when we found that several wounds in which there was no apparent infection separated in their deeper layers when the catgut sutures gave way.[4] Holman's technic embraces the careful excision of the entire pilonidal sinus with, however, conservative removal of skin and surrounding fibrous and fatty tissue. Flaps composed of gluteal fascia and muscle are elevated by sharp dissection from the posterolateral margins of the sacrum on either side and are sutured together in the midline and to the postsacral fascia or aponeurosis. Suturing these flaps together usually does away with the dead space. In most cases a continuous subcuticular suture of steel wire is adequate to close the wound, and no additional subcutaneous stitches are necessary. These patients were given penicillin postoperatively; in some cases other chemotherapy was administered, in addition. They were kept in bed, lying prone for a minimum of a week or longer. In general they were fairly comfortable; a few of them had a moderate degree of pain, but some (13 per cent) developed infection or hematoma, necessitating the opening of the wound.

Cautery and Scalpel Excision with Packing

For details of these technics reference is made to the excellent papers of Rogers[5] and of Liburt.[6] Both these authors rightly emphasize that good results, — which means eventual healing in the great majority of cases, with few recurrences, — are directly dependent on the constant supervision and the application of dressings by the operating surgeon. In our experience healing times following these operations have been extremely long (average, 129 days), because of the large size of the wound created by complete excision of walls of the sinuses.

Marsupialization

This operation, as advocated by Buie[7] and others,[8] is much simpler and more brief than either the excision by knife or cautery or the excision with primary suture by the Holman or any other method. The sinus is simply laid open for its full length, using a skin incision as close to the midline as possible. Any lateral sinus tracts or pockets are carefully laid open also. If this cannot be done through the same skin incision, a T or Y extension is made. Loose, chronically infected granulation tissue and hair nests are curetted out, any septums or lateral pockets are opened and the sinus lining is curetted down to its base of rather firm scar tissue. Overhanging skin edges are excised conservatively, particularly if they include margins of sinus tracts or scar. It seems neither necessary nor desirable to excise completely the fibrous portion of the sinus wall, since this tissue must regrow in any event in the course of healing. Skin edges are then sutured down to the lateral margins of the scar-tissue bed of the sinus in such a way that the wound is converted into a saucer or groove, with the fibrous wall of the cavity exposed only at the bottom. The

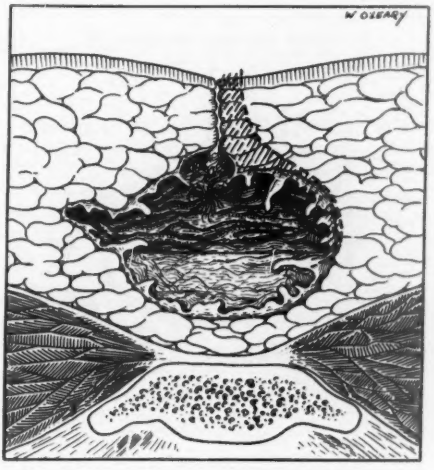

FIGURE 1. *Pilonidal Sinus with Abscess. Broken line indicates tissue removed in marsupialization.*

wound produced by marsupialization is as little as one quarter or one sixth the size of the defect resulting from excision by cautery or knife. This reduction in the size of the wound cavity bears a direct relation to the healing time and is the essence of success in this operation (Fig. 1–3). Double-zero plain catgut has been found to be approximately the right caliber of suture. It remains in place for about four to six days, which is long enough for the lateral skin margins to adhere, the advantage of the small wound created at operation being retained. The use of catgut rather than silk obviates the necessity of removing silk sutures at a later date. We perform the same sort of marsupialization on pilonidal-abscess cavities three or four days after incision and drainage of an acute abscess, — or even at the same time in some cases. Such abscessed sinuses have responded very well to this procedure, and we have been particularly interested to note that they seem to heal even faster than the average

marsupialized sinus. This may be due to the stimulation of a greater blood supply by the acute infection.

The rarely encountered sinus that takes the form of a narrow subcutaneous tract running down to or partially around the anal sphincter presents no special therapeutic problem. It will heal rapidly after simple excision and packing.

Preoperative and Postoperative Care

The conduct of preoperative and postoperative care has varied somewhat with the type of surgical procedure selected for a given pilonidal sinus. When the excision with suture is contemplated it seems wise to subject the patient to a period of careful preoperative cleansing of the skin, which may include vigorous scrubbing, showering or sitz baths for several days until healing without infection seems likely. If excision with packing or the marsupialization operation is decided on, the preoperative preparation of the skin need not be so vigorous or lengthy. Postoperatively, it may still be worth while, in this type of operation, to give penicillin parenterally to minimize the spread of infection. The iodoform pack placed in the wound at the time of operation usually loosens in two or three days and can be removed, after which the use of antiseptic irrigations or wet dressings may be helpful in treatment of the larger defects of the excised and packed sinus; for the smaller defects of the marsupialized sinus, daily showering and a plain gauze dressing suffice. The marsupialized sinuses have left by far the most easily treated wounds in the hospital, — and their care after discharge is much simpler than that of the excised sinus with packed-open wound. At the weekly visits it is usually necessary to shave a few ingrowing hairs; occasionally a small skin bridge must be separated. The scars have been quite satisfactory in most cases.

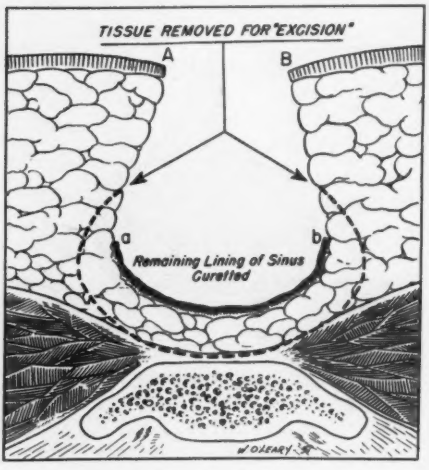

FIGURE 2. *First State of Marsupialization. Broken line indicates additional tissue removed in usual "excision" operation.*

Results of Surgery

In tabulating results of surgical procedures in this group of 359 patients with symptomatic pilonidal sinuses it has been found worth while to consider first the factor of infection existing in the sinuses prior to operation.

The lesions have been classifiable generally as: essentially uninfected small sinuses, acutely infected sinuses and chronically infected and draining sinuses. Table 1 indicates the distribution of our patients on this basis and the measure of success obtained with each of the three types of operations. Table 1 also shows that although the poorer results for primary closure were obtained in the acute and chronically infected group good results in any of the three classifications were obtained by marsupialization.

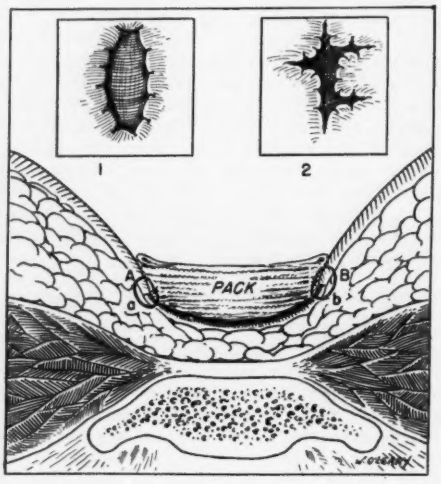

FIGURE 3. *Completed Marsupialization. Inserts 1 and 2 show surface views of 2 types of sinuses so treated.*

The influence of previous operations on the results is demonstrated in Table 2. Primary closure yielded best results only when the sinus had not been operated on before, whereas previous opera-

tive procedures had little effect on sinuses treated by marsupialization.

The duration of hospital stay and total healing time are factors that are secondary to recurrence rates in this troublesome condition. Table 3 shows that the hospitalization period was twice as long for primary closure or excision with packing as for marsupialization. Hospital stay for the marsupialization procedure averaged only 6.3 days. Three or four days proved to be the most suitable hospital stay after a marsupialization, whereas eleven to twelve days was an irreducible minimum after primary closure of a large sinus. The matter of total time for initial healing also is dealt with in Table 3. Excision and packing required 129 days, — the longest period for healing, in contrast to forty-three days for marsupialization. Most of this time, of course, transpired after discharge from the hospital. The ten days' healing period indicated for primary closure represents that for primarily healed wounds not very good (67 per cent cures). It is interesting that only half the wounds that healed did so in less than four months' time. The poor results obtained after excision and packing in contrast to low recurrence rates of 5 per cent or less reported in some other series may be explained by the fact that many of the sinuses so treated were recurrent, at times being complicated by retained silk sutures. The lack of a daily out-patient surgical clinic at this hospital in addition to long commuting distances for many patients also contributed to the poor results of excision and packing.

Table 4 summarizes our over-all results in the surgical management of pilonidal sinus. Follow-up periods for the primary-closure cases averaged 25.6 months and for marsupialization 12.8 months, permitting fairly valid analyses. The 16 per cent recurrence rate for marsupialization represents 19 cases, in which most of the recurrences were minor in degree. Six healed promptly after minor incision in the follow-up clinic. Four of the remainder were rehospitalized and had a repeat marsupialization without success. Nine patients had inconsequential recurrences and did not wish to return to the hospital for further surgery. Retained silk sutures dating from earlier primary closures apparently caused some of the recurrences after marsupialization. In a special group of 12 cases, only and is no index of the success of the procedure in general.

The group of 39 cases treated by excision and packing is too small to permit definite conclusions. In evaluating this type of operation we soon found that the period of hospitalization was long (average, fifteen days), that the total healing time was prolonged (average, 129 days) and that the results were

TABLE 1. *Pilonidal Sinus: Influence of Infection on Healing.*

	No Infection			Acute Infection			Chronic Infection		
	No. of cases	Percentage of cases	Percentage of cures	No. of cases	Percentage of cases	Percentage of cures	No. of cases	Percentage of cases	Percentage of cures
Primary closure	82	48.5	75	6	3.5	—	84	48	56
Marsupialization	20	17.0	95	47	39.0	83	53	44	81
Excision and packing	3	8.0	100	24	62.0	71	12	30	50

TABLE 2. *Pilonidal Sinus: Previous Operations.*

	No Previous Operation			Incision and Drainage (or more)			Definitive Surgery		
	No. of cases	Percentage of cases	Percentage of cures	No. of cases	Percentage of cases	Percentage of cures	No. of cases	Percentage of cases	Percentage of cures
Primary closure	93	54	71	56	32	62	23	14	30
Marsupialization	62	51	81	40	33	90	18	16	84
Excision and packing	14	36	78	5	14	100	20	51	50

TABLE 3. *Pilonidal Sinus: Treatment and Healing Times.*

	Marsupialization	Primary Closure	Excision and Packing
No. of cases	120	172	39
No. of hospital days	6.3 days	15.2 days	15 days
No. of days to initial healing after operation	43 days	10 days	129 days
Percentage of recurrence	16	37	33

patients were admitted with an acute abscess. Incision and drainage was followed four days later by marsupialization, with rapid healing in all but one case. The cure rates, as shown in Table 4, are based on cases successfully followed (92 per cent).

Comment

One of the most realistic discussions of the pilonidal sinus problem was presented by Buie[7] in 1944. He stated that in the period just prior to World War II, United States Navy personnel were experiencing more sick days due to pilonidal sinus and its surgical treatment than were due to hernia or gonorrhea. He was confident that the average results of various surgical procedures for pilonidal sinus were much inferior to those obtained and reported by certain service medical centers, where this problem undoubtedly received special attention. The percentage of seriously delayed healing and of later recurrences for various primary-closure operations performed by surgeons of average skill appeared to be as high as 50 per cent. This poor showing resulted in official limitations on such procedures at that time.

Table 4. *Results of Pilonidal Surgery.*

	Primary Closure	Marsupialization	Excision and Packing	Totals
No. of cases	187	127	45	359
Follow-up				
Percentage of cases followed	92	95	86	92
Average time followed	25.6 mo.	12.8 mo.	23.3 mo.	
Percentage of cures, first operation	63	84	67	
Percentage of cures following subsequent operation	86*	89	74	

*Cure obtained in several cases by marsupialization or excision and packing.

Experience during the postwar period in a Veterans Hospital has led us to similar conclusions; that is, that primary-closure operations in a large series of chronically infected pilonidal sinuses have been accompanied by an unsatisfactorily high rate of initial infections and separation with delayed healing and of later recurrences, — twice as frequently as with open methods. Excision by knife or cautery yielded a somewhat higher percentage of eventual healing, but the healing time averaged over four months. Buie illustrates in his paper the marsupialization operation first described by him in 1937 as a way to reduce radically the healing time and discomfort and disability associated with the open operation without sacrificing its good record of cure.

Results of the marsupialization operation in 127 patients at this hospital give proof of Dr. Buie's contention. The patients are surprisingly comfortable and require little wound care. All members of the staff have been so impressed by the simplicity and effectiveness of marsupialization that other operations have been largely discarded.

The recent report by Kleiman[9] from the Halloran Veterans Hospital advocating primary closure is not readily comparable with this study. Removable wire stay sutures may give better results than buried silk in primary sutures, although in a limited trial the wire technic did not prove satisfactory in our hands. Furthermore, our experience has shown that reports of cure rates of pilonidal sinus covering the period of the hospital admission and without follow-up studies of a year or more may be erroneously optimistic, as indicated in Table 4.

One exception to the nearly universal application of marsupialization lies in the recurrent case after primary closure employing buried nonabsorbable sutures. The only certain way of removing all such suture material is by complete excision of chronically infected tissue and scar, plus packing.

Summary and Conclusions

A comparative study of surgical procedures for pilonidal sinus has been conducted at the Veterans Hospital, West Roxbury, Massachusetts, over a three-year period involving 359 patients with this condition and almost 500 operations. Follow-up data for periods averaging one year were obtainable in 92 per cent of the patients.

During the earlier part of the study excision with primary suture was performed in all possible cases on the theory that this procedure would be the ideal, if successful. A review of 187 cases so treated revealed that the incidence of immediate breakdown or infection in the hospital was unsatisfactorily high (13 per cent) after this operation. Furthermore, the total failure rate of 37 per cent was also too high to indicate this as the procedure of choice. Marsupialization was resorted to as a surgical maneuver that might include the relative certainty of healing and the low recurrence rate obtained when sinuses were carefully excised and packed open but would avoid the extremely slow healing frequently encountered after complete excision of a large sinus.

The procedure of marsupialization has been found to meet these requirements exceptionally well. The average total hospitalization time in marsupialized cases was 6.3 days, and the average healing time 43 days. The over-all cure rate for marsupialization was 84 per cent; this could be improved considerably by omission of recurrent cases, particularly those with retained suture material. The recurrences encountered were small in size and generally were not troublesome. Marsupialization appeared to be the most comfortable operation for the patient, caused the least loss of time to him both in the hospital and thereafter, and was by far the most economical. Marsupialization, therefore, has proved itself the surgical treatment of

choice for symptomatic pilonidal sinus in our experience.

Because pilonidal sinus again promises to be a frequent and vexing problem marsupialization is strongly recommended for its routine management in the re-expanding Armed Forces.

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ORAL ADMINISTRATION OF CORTISONE IN A CASE OF ERYTHEMA NODOSUM*

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BOSTON

IT HAS long been known that erythema nodosum occurs in association with tuberculosis and rheumatic fever.[1, 2] Within recent years clinicians have often noted its relation to such varied diseases as streptococcal infections,[2] coccidioidomycosis,[3] meningococcemia,[4] influenza,[5] ulcerative colitis[6] and drug reactions.[7] Because of its association with this wide spectrum of disease, erythema nodosum has been considered a manifestation of hypersensitivity.[8]

Since cortisone has been observed to have dramatic effects on hypersensitivity states,[9] it was considered of interest to utilize this drug in the treatment of erythema nodosum.

The present report describes the immediate and striking response to orally administered cortisone observed in a young man with severe, persistent erythema nodosum.

Case Report

M. B. (B.I.H. M 17695), a 28-year-old man, entered the hospital on January 15, 1951, complaining of pain in the knees and ankle joints and multiple warm, tender, red nodules over both lower legs.

The patient had been in good health until four weeks prior to admission, when he noted the gradual onset of malaise, anorexia and severe pain in the ankles, interfering with walking.

Three weeks prior to admission tender pruritic, warm, red nodules approximately 0.5 to 1 cm. in diameter were observed over the lateral aspect of the knees, legs and ankles. These disappeared in the next four days but recurred and increased in size and severity up to the time of admission.

One week before entry slight stiffness and restriction of elbow motion were noted.

The patient had no history of upper-respiratory diseases, sore throat, arthritis, rheumatic fever, tuberculosis, venereal disease or exposure to coccidioidomycosis. He had undergone tonsillectomy as a child.

He had a marked allergic history characterized by vasomotor rhinitis induced by exposure to dust, ragweed, goldenrod and horse and dog dander. Desensitization had been unsuccessful. In recent years antihistaminic drugs had afforded relief of symptoms, but the patient had discontinued these six months prior to the present illness. In 1945, while in the Army, he developed swelling of the mucous membranes of the mouth and pharynx after taking sulfadiazine. Both parents had a history of hay fever.

For several months prior to admission he had received injections of a five-per-cent solution of urea and quinine for hemorrhoids. The last injection had been given several days prior to the onset of the present illness.

On physical examination the heart rate was 84 beats per minute, the respirations 20, the blood pressure 130/70 and the oral temperature 100° F.

The significant physical findings were limited to the legs. There was a tender, warm, raised, erythematous lesion 7 cm. in diameter over the lateral aspect of the left knee joint. Multiple similar lesions, 0.5 to 1 cm. in diameter, were distributed over both lower legs, ankles and dorsal aspects of the feet. In the center of several lesions was a yellow area. The skin was not movable over any of these lesions. All affected areas blanched on pressure. There was increased warmth over both knee and ankle joints, with moderate restriction of joint motion.

There was no hepatic enlargement or lymphadenopathy. The spleen was not palpable. The nasal mucous membranes were atrophic. The remainder of the physical examination was negative.

Examination of the blood disclosed a red-cell count of 4,260,000, with a hemoglobin of 16 gm., and a white-cell count of 13,000 on admission and 7600 two days later. The smear and differential count were normal. The urine was negative for sugar and albumin; the specific gravity was 1.025. Examination of the stool was negative. The total protein was 7.4 gm. per 100 cc., with 4.7 gm. of albumin and 2.7 gm. of globulin. The uric acid was 3.2 mg. and the serum potassium 4.5 milliequiv. per liter. A blood Hinton test was negative. Mantoux skin tests were negative in dilutions of .00002 and .005 mg. of purified protein derivative. Two throat cultures were negative for pathogenic organisms. Two blood cultures showed no growth. A Schwartz–McNeil complement-fixation test was negative. Corrected sedimentation rates (Rourke–Ernstene method — normal = 0.08–0.35 mm. per minute) were 1.4 mm. per minute on entry, 2 mm. on the ninth hospital day (twenty-four hours before cortisone was administered) and 1.1 mm. after two weeks of cortisone therapy. Agglutinations for typhoid, paratyphoid A and B, proteus OX 19 and *Brucella abortus* were negative on two occasions. The anti-streptolysin titer was 100 units. An electrocardiogram made on the second hospital day was within normal limits. A roentgenogram taken on admission revealed extensive hilar mediastinal lymphadenopathy. A repeat film made twenty-six days later showed no change. X-ray of the knee and ankle joints showed periarticular swelling. The eosinophil count prior to administration of

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cortisone was 156 cells per cu. mm.; after nine days of cortisone therapy it was 19.

With the patient resting in bed with the legs in a protective cradle and 0.6 gm. of acetylsalicylic acid being administered orally every two hours while he was awake, no objective or subjective change was observed. During the fifth hospital day new painful lesions developed over the left elbow joint. Tripelennamine hydrochloride, 50 mg. three times a day, was administered orally for the next forty-eight hours with no demonstrable effect.

On the seventh hospital day intramuscular injection of procaine penicillin, 300,000 units twice a day, was begun; this was continued for the next three and one-half days. There was no change in the patient's clinical course. There were daily temperature elevations to 101°F., with a corresponding increase in pulse rate.

On the tenth hospital day, six hours after the oral administration of 100 mg. of cortisone, the patient noted definite improvement in joint pain and disappearance of tenderness in the skin lesions. Fifteen hours after the initial dose of cortisone the patient noted relief of all joint and skin pain. During these fifteen hours the skin lesions felt cooler; within twenty-four hours they had faded markedly, leaving only a faint pink discoloration. The patient's rectal temperature had fallen precipitously from 101 to 98.6°F.

On oral administration of 100 mg. of cortisone twice daily for the next four days, the patient was completely asymptomatic and afebrile, with continued objective improvement. He was placed on a regimen of 50 mg. of cortisone twice daily for two days and was discharged on the sixteenth hospital day on a maintenance dose of 25 mg. twice a day.

Five days after discharge he noted a mild recurrence of right-ankle and wrist pain but no return of skin lesions. The dose was increased to 100 mg., and symptoms disappeared within twelve hours. Two days later the dose was reduced to 75 mg. This was continued for three weeks, after which cortisone therapy was discontinued. The patient has remained asymptomatic and afebrile for two months.

Comment

It seems clear that cortisone suppressed the clinical manifestations of erythema nodosum in this patient.

A spontaneous remission of the disease seems unlikely, as during a precortisone period of several weeks the pain, swelling, skin lesions and fever continued unabated, and there was no objective or subjective improvement on salicylates, tripelennamine hydrochloride or penicillin therapy. There was, moreover, a dramatic response to cortisone, with relief of pain, rapid fading of the skin lesions and fall in temperature within twelve hours of administration of the initial dose. The recrudescence of erythema nodosum when the maintenance dose of cortisone was reduced and the subsequent improvement when the dose was increased support the opinion that a spontaneous remission did not occur.

A search of the literature and correspondence with Dr. J. W. Crane of the laboratories of Merck and Company have revealed no other reports of treatment of erythema nodosum with cortisone.

Summary

A report is presented of a case of erythema nodosum that responded promptly to orally administered cortisone after other therapy had failed.

The patient received 100 mg. of cortisone twice daily for five days. After two days on a reduced dose of 50 mg. twice daily, and five days on a maintenance dose of 25 mg. twice daily, he had a mild exacerbation of joint pain, which cleared promptly when the dose was increased to 100 mg. for three days. He was then maintained on 75 mg. for three weeks, after which cortisone was discontinued. He remained asymptomatic and afebrile for two months.

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MEDICAL PROGRESS

FOREIGN BODIES IN THE RESPIRATORY TRACT

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A MAJORITY of the articles referred to in this review, which covers the period from 1945 to 1948, deal with isolated reports of unusual cases of lodging of foreign bodies in some portion of the respiratory tract. The spectacular nature of such cases and the often dramatic recovery that follows removal of the foreign body have, since the earliest days of endoscopic examination of the airways, made this occurrence of great medical interest. Because of constant efforts on the part of the bronchoscopist to educate the laity and the general practitioner in the prophylactic measures directed toward avoidance of such accidents and in the most expeditious recognition of their occurrences, fewer foreign bodies are aspirated, or their presence is detected more promptly, today than was the case twenty years ago. Nevertheless, the continued appearance of sporadic accounts in the literature of cases of aspiration of foreign objects indicates that such educational efforts cannot be relaxed and that avoidable carelessness, inadequate histories and superficial examinations are still potent factors in the occurrence of these often serious and occasionally fatal accidents.

In surveying the current literature on this subject one is impressed by the increasingly clear clinical picture that has come to be associated with the presence of a foreign body in the trachea and bronchi. This is delineated with such clarity by Holinger and Rigby[1] that their article merits a detailed summary. As illustrative of major patterns of pulmonary disease incident to foreign-body aspiration, they cite three cases. The first is that of a ten-year-old girl who had suffered continuously for five years from supposed pneumonia or bronchitis. No history of foreign-body aspiration had been elicited, but an x-ray film showed a metal screw in the right-lower-lobe bronchus and an infiltrative process in the left lower lobe. Despite removal of the foreign body twelve days later the patient continued to suffer for five years from bilateral bronchiectasis, acute exacerbations of pulmonary infection and later bronchial stenosis, in which a right-lower lobectomy ultimately effected much improvement. The authors comment on the fact that the foreign body was completely overlooked for five years, allowing an easily remediable bronchial obstruction to lead to bronchiectasis and severe chronic pulmonary infection.

The second case is that of a five-year-old girl who choked while eating peanuts, with resultant wheezing respiration, marked dyspnea and extensive subcutaneous emphysema. Bronchoscopic removal of the peanut was followed in six days by complete resolution of the previous clouding of the right middle lobe and of the subcutaneous emphysema.

The authors explain the subcutaneous emphysema on the basis of a partial valve-like obstruction of the bronchus (obstructive emphysema), which leads to an increase in alveolar pressure sufficient to produce formation of bullae beneath the visceral pleura. Air from subpleural rupture of a bulla finds its way to the hilum of the lung and thence up the mediastinum, into the neck and so under the skin, sometimes reaching the level of the groin. If a bulla ruptures into the pleural cavity a pneumothorax may follow, a most serious complication, which should be immediately dealt with by needle aspiration and the institution of negative pressure by means of a closed-pneumothorax drainage system.

A similar case of complicating subcutaneous emphysema is reported by Penta,[2] who describes the case of a 10-year-old boy who was said to have pneumonia. The patient subsequently developed mediastinal and subcutaneous emphysema, a high fever and a collection of fluid in the left chest that required aspiration. At bronchoscopy a portion of the rubber sac of a fountain pen was removed from the left main bronchus, after which complete recovery ensued in a week. Penta stresses the importance of careful history-taking, the lack of which in this case contributed to the seriousness of the patient's situation.

A similar condition is described by Maness,[3] in the case of a boy of 7 who choked while eating peanuts. Treatment with sulfadiazine was followed by a fever of 102°, wheezing and a swelling of the soft tissues of the neck, with palpable subcutaneous emphysema. The right chest was hyperresonant, and x-ray films showed a shift of the mediastinum to the left, air in the mediastinum and a "small pneumothorax" on each side. Bronchoscopic removal of half a peanut from the right-lower-lobe bronchus was followed by complete and rapid recovery, with disappearance of the pneumothorax

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and slower disposal of the mediastinal and subcutaneous air.

Holinger's[1] third case is that of a five-year-old girl who, thirty-six hours prior to admission, had aspirated the metal reed of a whistle, which was shown by x-ray to be lodged in the right main bronchus. The only physical abnormality was a wheeze heard over the right nipple that disappeared immediately on bronchoscopic removal of the whistle. In the case of merely partial bronchial obstruction an audible wheeze may be the only diagnostic sign of an aspirated foreign body, particularly when the object is not radio-opaque.

The authors describe four classical types of valve-like obstruction of the major airways:

Bypass, as in Case 3, where this obstruction is only partial, permitting air to pass easily beyond the obstruction in either direction.

Check valve. In this condition inspiration is unimpeded but the egress of air is prevented, with resultant trapping and emphysema, as in Case 2. A modification of this type is the ball-valve effect produced by a movable obstructing object that may at times allow air to leave but not to enter the lung, with resulting atelectasis.

Stop-valve. In these cases obstruction to the entrance of air is complete, with absorption of all air from the peripheral lung and subsequent atelectasis.

The classical symptoms of a foreign body in the lower respiratory tract are coughing, wheezing and dyspnea, in various combinations, regardless of the location of the foreign body, but the physical findings vary strikingly with its location. If the latter is in the trachea there are, classically, an asthma-like wheeze, an audible slap as the foreign body strikes the undersurface of the vocal cords, some degree of stridor, rales and retraction of the thorax. The picture is one that may easily be confused with bilateral bronchial obstruction and is frequently characterized by negative findings on x-ray examination. Kjellberg[4] reports a previously unrecognized finding associated with a tracheal foreign body in children in whom the tracheal rings are compressible and soft. He noted in the x-ray film that on inspiration the trachea below the foreign body becomes narrower because of negative pressure whereas the trachea above the foreign body (the larynx, especially) becomes dilated. On expiration the lower trachea becomes either normal or wider than normal, although above the foreign body the tracheal lumen is normal or abnormally narrow. By this means inconspicuous shadows representing a foreign body are less likely to be overlooked. This author reports a case of a one-year-old child who had a piece of bark in the trachea.

Unilateral bronchial obstruction, according to Holinger,[1] presents two groups of physical findings:

Partial. Typical findings are unilateral obstructive emphysema, limited chest expansion, hyperresonance to percussion and suppressed or absent breath sounds on auscultation. Wheezing or rales may also be noted. The heart and mediastinum are shifted to the side opposite the foreign body.

Complete. The physical signs here simulate pneumonia, empyema or drowned lung. Chest expansion is diminished, the heart shifts to the involved side and the diaphragm is elevated homolaterally. Rales, dullness to flatness on percussion and bronchial to absent breath sounds complete the clinical picture.

At fluoroscopic examination bypass obstruction show no abnormality. In check-valve and ball-valve obstruction there is an increased transparency of the lung field, depression and limitation of motion of the diaphragm, displacement of the heart and mediastinum to the opposite side and increased diaphragmatic motion on the uninvolved side. These changes are best detected by observing the lung fields at extremes of inspiration and expiration. In incomplete obstruction at the end of inspiration the radiance of the two sides is equal, whereas at the end of expiration the radiance is less on the normal side. In complete obstruction (atelectasis) the shift of the heart and mediastinum is to the affected side on both inspiration and expiration. There is elevation and fixation of the diaphragm on the affected side. A compensating emphysema of the normal side may be noted in conjunction with the density of the atelectasis of the lung. This may lead to confusion with the picture of obstructive emphysema, and thus to a false conclusion concerning the location of the foreign body. If only small segments are involved, the affected portions show corresponding triangular shadows.

That both partial and complete bronchial obstruction may be produced by a single foreign body is illustrated by the report by Jerram and Cruickshank[5] of a 10-year-old child who developed a wheezing cough five days after eating chocolate that contained nuts. Breath sounds were diminished over the right upper lobe, with dullness to percussion. The right lobe was hyperresonant and the mediastinum was shifted to the right. X-ray examination showed no disease on the left side, a complete collapse of the right upper lobe and emphysema of the right-middle and lower lobes. Bronchoscopy revealed a foreign body (a nut) in the right main bronchus, completely occluding the right-upper-lobe bronchus and partially occluding the right main bronchus, a combination of the two types of obstruction.

Holinger[1] also points out the following cardiovascular effects of bronchial obstruction: 1. Increased pulmonary capillary blood pressure, with transudation of serum into the alveolar spaces. 2. Exudation into alveoli due to the suction action of intrabronchial and intra-alveolar negative pressure. 3. A vicious cycle due to the combination of

1 and 2, producing pulmonary edema and circulatory failure from rising intrathoracic negative pressure.

In 1937 Seydell[6] reported an unusual series of cases, in each of which a specialized form of foreign body, a grass head (wheat, rye and so forth) entering a bronchus with the spear pointed downward, made its way spontaneously through the lung tissue, across the pleural cavity and through the thoracic wall, to appear finally beneath the skin of the chest wall. Such foreign bodies pursue their unusual course by virtue of the ratchet action of the sharp barbs on the grain head and are usually beyond bronchoscopic reach before their presence is discovered. A similar case of such a foreign body in a 4-year-old boy is recorded by Sehring and Shaw.[7] The patient, complaining of abdominal pain and fever four days after supposedly swallowing a head of grass, developed signs of pneumonia of the right lower lobe. Systemic improvement followed chemotherapy, but there was no change in the clinical findings. Continued cough led to hospitalization. Four days after admission there appeared in the right midaxillary line, at the level of the sixth intercostal space, a red, tender, fluctuant mass, aspiration of which yielded pus and a large "fox-tail" or head of grass resembling the top of a stalk of wheat, 5 cm. in length. The wound healed quickly and the patient's cure was complete.

The extensive pulmonary disease often accompanying this special type of foreign body is discussed by Carter and Welch,[8] who investigated a series of cases of bronchiectasis in which lobectomy showed the foreign body to be such a grass head. In eight patients ranging in age from 1 to 14, 5 gave a positive history of aspiration. The duration of sojourn of the foreign body ran from two to thirty-six months. Of 7 patients who underwent lobectomy, all were well at the last report. In only 2 was a foreign body suspected prior to operation, its location being on the right side in 7 of 8 cases. Seven bronchoscopies were performed, with recovery of the foreign body in only 3 and without visualization of one foreign body, but all 7 required subsequent lobectomy for chronic suppuration characteristic of abscess or bronchiectasis quite unrelated to the type of foreign body. Delayed diagnosis was due primarily to the failure to elicit a readily available history of aspiration and to the lack of prompt recognition of foreign body as a diagnostic possibility. In only one case did the patient remain free of symptoms after bronchoscopic removal of the foreign body. One reason for the extreme degree of bronchial penetration was the paucity of striking symptoms, which are more evident in younger patients; the only bronchoscopic cure was that of the youngest patient. In every instance the grass head was found lying in the branch bronchus, with the stem pointing downward. Diagnostically, unstained smears of bronchial secretion or blood may show vegetable fibers and the time of year (most commonly June and July) may be a valuable indication of the possible type of foreign body.

Failure to regard a foreign body as a possible cause of unexplained symptoms in the respiratory tract is noted repeatedly in any survey of literature on this subject. Hamilton[9] describes the case of a 2-year-old boy, who was treated for hoarseness and a croupy cough with diphtheria antitoxin and subsequent tracheotomy. After two weeks of futile attempts at decannulation, a laryngoscopy performed five weeks after the onset of symptoms revealed granulation tissue in the larynx, in which was buried an open safety pin, point up. Its removal was followed a month later by successful extubation and complete recovery.

Of a similar nature is the case report of Hunter,[10] in which an 11 month-old boy was hospitalized for congenital laryngeal stridor following vague symptoms of cramps, pneumonia and rickets for four months and, during the last three weeks, complaints of vomiting and dysphagia for which attempted passage of a feeding tube had been unsuccessful. Chest x-ray films were reported as "normal." On laryngoscopy a foreign body, observed to be impacted between the vocal cords, was revealed as a metal rivet one-half-inch long, with a base one-half inch in diameter. A review of the x-ray film clearly showed a shadow previously thought to have been an object in the clothing.

Friedman[11] adds to the list of such unrecognized accidents the case of a 12-week-old child who after seven weeks of unexplained hoarseness developed a cervical fistula and an abscess below the hyoid bone. Incision and drainage was followed to a persistent sinus in which there appeared, forty-five days after the onset of symptoms, a metallic pin shaft 1 cm. in length. X-ray films then revealed an open safety pin in the pharynx, point down, removal of which was followed by abatement of all symptoms.

That not every foreign body reaches the lung via the mouth is attested by the report of Domokos[12] of a 31-year-old man who in September 1944, was a victim of a mine explosion that suddenly drove a steel fragment through the chest wall and into the lung. A superficial abscess appeared later below the scapula; it proved to contain a bean-sized fragment of wood. For the following two years the patient suffered from fever, cough and foul expectoration. In January, 1946, at the level of the external scar between the second and third intercostal spaces, x-ray examination revealed a cavity in which lay a bean-sized metallic foreign body. In February a trochar was introduced into the abscess cavity at the site of the scar and the foreign body was grasped with forceps through the trochar. Only a splinter of wood was recovered, a larger portion of the foreign body impinging on the end of the

trochar. Forceps were then introduced directly along the track made by the trochar and the foreign body was grasped and readily removed. Negative pressure drainage through the abscess cavity was followed by recovery.

It is rarely impossible to identify the nature of a foreign body found in the respiratory tract, but Cleland[13] recounts an instance of post-mortem finding of multiple foreign bodies lying buried in consolidated alveolar tissue, the nature and origin of which was entirely unknown.

Recurring throughout many accounts of aspiration of foreign bodies is the stress on the importance of a careful inquiry into the history of possible aspiration. Ferguson[14] stresses the role often played by a well-meaning parent who, seeing a child with a foreign body in his mouth, incites the child to crying, with resultant sudden, unprotected inspiration of the foreign body. Deceptive abatement of initial symptoms often leads to the belief that the object has been safely swallowed, with resultant delay in making the correct diagnosis. Stress is laid on these same factors by Richardson,[15] who in addition points out the dangers of premature attempts at foreign-body removal before adequate preliminary studies have been made or before all necessary facilities are at hand, among which a duplicate of the foreign body is of utmost importance in solving the presenting mechanical problem.

In a detailed explanation of the reasons that foreign bodies in the respiratory tract are so frequently overlooked, Rosedale[16] quotes the Jacksons as saying that more than 200 patients had stated to them that from one to ten practitioners had ignored, and in some cases ridiculed, the possibility of foreign-body origin of their symptoms. Rosedale submits the following reasons for overlooking such an etiology: failure to consider foreign body as a possibility; failure to elicit an available history or to discount its absence; skepticism and indifference concerning such an etiology; unjustifiable reliance on a symptomless interval after aspiration, resulting in delay while awaiting appearance of classical symptoms and physical findings. The author answers the often-asked question concerning what happens if a foreign body is not removed from the respiratory tract by quoting figures from Jackson and Coates, who give a mortality of 95 per cent, only 2 to 4 per cent of foreign bodies being spontaneously coughed up. If adequate operating skill and equipment are available, 94 per cent should be removable bronchoscopically.

The longest sojourn of a foreign body covered by this review is that described by Lewin[17] in a man of 67 who was thought on x-ray examination to have a right-lower pneumonitis. On bronchoscopic examination a foreign body, lying 4 cm. from the bifurcation, was identified as the vulcanite mouthpiece of a pipe. The patient then recalled falling off his bicycle with his pipe in his mouth 31 years previously. Despite removal of the object the patient died of pulmonary sepsis. He had presumably tolerated such an object in the bronchus for so many years because of the air channel in the pipestem.

Almost equally disastrous damage to the lung in prolonged foreign-body sojourn is described by Childress and his associates[18] in the case of a six-year-old girl who suffered for four years from cough and fever. Foreign-body history was negative, and only after long delay did an x-ray film reveal a nail 3 cm. in length in the right main bronchus, with associated bronchiectasis. On bronchoscopic removal the shaft of the nail separated from the head, which was aspirated in fragments six months later, in purulent secretions. Residual atelectasis, bronchiectasis and repeated hemoptysis required subsequent removal of both middle and right-lower lobes, with resultant complete recovery in three months. The specimen showed bronchiectatic abscess in both lobes. The authors stress the loss of valuable time as a possible etiologic factor in all chronic respiratory disease.

Although it is a rare condition, agenesis of one lung may at times lead rapidly to death if the remaining lung by chance becomes blocked off by accidental aspiration of a foreign body. Such an instance is reported by Mitchell,[19] who found only 2 instances of this congenital abnormality in 15,000 case records at Johns Hopkins and noted that only about one hundred such cases had ever been reported.

Commonest of all aspirated foreign bodies in children is some form of nut, most frequently the peanut, either singly or incorporated in candy. Bonnier[20] reviews his series of 45 cases of peanuts removed from the lower airways, a group representing 60 per cent of a total of 75 foreign bodies found in the respiratory tract in nine years. Seven peanuts were removed in a single month. The ages of patients ranged from 3 months to 10 years, 37 of the 45 being in the one- to three-year group. Sixty-six per cent of the patients gave a positive history of aspiration. In 30 cases the peanut was lodged in the right side, in 11 on the left and in 3 in the trachea. One death occurred from a right-sided atelectasis complicated by crusting obstruction on the left. In only 7 cases was the peanut fragment small enough to penetrate beyond a main bronchus. Characteristic indications of a tracheal foreign body were an asthmatic wheeze, rales, cough or noisy rhonchi and a negative x-ray report.

The duration of lodgment of the foreign body varied from a few hours to ten months. The larger the fragment and the higher the point of lodgment, the more extensive was the blocked area of lung and the greater was the respiratory obstruction. Symptoms were often surprisingly minimal. Patients were generally afebrile; only two patients showed a leukocytosis. The adjuvant use of chemo-

therapy may have led to this amelioration of symptoms in the later cases in the author's series; it seemed beneficial when used routinely during the entire course of the illness. It is difficult, however, to explain how the use of chemotherapy could have reduced the tendency toward so-called arachidic bronchitis, which many authors believe is caused by oil in the peanut. Bonnier found many instances of prolonged sojourn of the peanut that were entirely free of the clinical reaction that is often described.

In a second article Bonnier[21] summarizes his experiences with 50 cases of foreign body in the respiratory tract, classifying them according to location, nature of the foreign body, duration of sojourn and clinical and roentgenologic findings. Accompanying the report are pictures and histories of unusual cases.

A somewhat similar résumé of cases of respiratory obstruction incident to aspiration of vegetal foreign bodies is given by O'Brien,[22] who reviews the whole history of their removal by bronchoscopy with special reference to the pathologic changes associated with so-called arachidic bronchitis. This presentation consists of 23 detailed case histories and a bibliography of 44 references.

The outstanding innovation in the technic of removal of metallic foreign bodies from the lower respiratory tract is Equen's[23-28] advocacy of the use of a new type of magnet. Magnetic removal of foreign bodies had previously been tried and abandoned by workers in this field as generally unsatisfactory. Equen has employed an entirely new type of magnetized alloy of aluminum, nickel, cobalt and iron. This alloy, fused under high pressure almost to the melting point in reducing gas, is manufactured by the General Electric Company under the trade name of Alnico-V. It is remagnetizable and can lift 25 times its own weight, yet is small enough to be passed through a 4-mm. bronchoscope, for which all previous forms of magnet have been too large. This innovation in foreign-body removal was first described at a meeting of the Southern Medical Association in 1944, and was applicable only to removal of objects in the esophagus and stomach. The smaller 4-by-0.3-cm. magnet attached to a ureteral catheter and designed for use in the bronchus was produced in 1945.

Equen has repeatedly reported success in the use of this magnet, which, in conjunction with the fluoroscope, has effected removal of foreign bodies that were far beyond bronchoscopic visualization and hence often difficult to seize with the conventional foreign-body forceps. Obviously, only such objects as contain magnetizable metal can be removed in this manner.

In discussing this question of the value of magnets in the removal of bronchial foreign bodies, Holinger[29] readily recognizes the superiority of the Alnico magnet to all previous types. He added the innovation of substituting for the form of magnet employed by Equen a rod of the same alloy 5 to 7 cm. in length and 3 to 6 mm. in diameter. This rod is then brazed to a rigid brass stylet 35 to 50 cm. long, the smallest combination of these being easily passed through the infant-sized bronchoscope. Holinger feels that such a rigid system offers superior directability and better control than the flexible catheter. He mentions that a real disadvantage of the magnet is the difficulty of detaching it from any foreign body with which it has once made contact before an ideal alignment has been achieved. Attempts to break contact by drawing the magnet away might readily subject the surrounding bronchial wall to serious trauma, as, for instance, in the case of a sharp-pointed pin or tack lying point upward. Moreover, if the bronchoscope is at any time passed downward over the magnet the magnetic attraction is at once destroyed.

Holinger believes that the magnet is most suitable for the extraction of long, slender magnetizable objects in the lower digestive tract in children and for such objects as ball bearings in the bronchi, but he prefers conventional forceps removal for sharp-pointed objects in the respiratory tract.

A statistical résumé of pulmonary complication incidental to aspiration of foreign bodies is presented by Holinger[30] and his associates in a series of 1026 consecutive cases. The age of patients ranged from 1 day to 84 years. Of 1061 foreign bodies, 20 per cent were bones, 15 per cent hardware, 11 per cent safety pins (an ironic designation), 14 per cent nuts and 14 per cent coins. Of 1076 foreign bodies, 29 per cent found lodgment in the lower airways. There follows a discussion of the customary pulmonary complications (emphysema, pneumothorax, atelectasis, asthma, bronchiectasis, empyema and laryngeal disease), a summary of which has already been given.

More and more bronchoscopists are finding the fluoroscope an invaluable aid in foreign-body removal. The reasons for this are presented by Hagens,[31] who stresses the value of this combined procedure even at times when it does not seem absolutely essential. Often a seemingly simple problem may prove to be unexpectedly complicated, as when an initially visible foreign body slips or is pushed beyond the range of vision. To support his view Hagens presents the following:

The case of a man of forty-seven with a nail in the bronchus. Forceps grasp under direct vision was too low and was corrected only with fluoroscopic aid.

The case of a child of ten with a miniature airplane wing in the left bronchus. Direct vision was occluded by granulation tissue, and removal was greatly facilitated by fluoroscopic guidance.

The case of a girl of seventeen with a safety pin in the right bronchus. Only a portion of the pin was removed bronchoscopically. The remainder was

quickly located in the stomach by fluoroscopy, with avoidance of further bronchoscopic instrumentation.

Hagens points out that the fluoroscopic table must be so constructed as not to hamper either the endoscopist or the fluoroscopist, an arrangement often not possible in conventional fluoroscopic tables.

No reviewer could summarize any period of time with regard to the subject of foreign bodies in the respiratory tract without repeated realization of the great debt owed by all workers in this field to the pioneer bronchoscopist Chevalier Jackson, through whose clinic have passed over 4000 patients with foreign bodies of every description. Podolsky[32] has brought together a fascinating group of events in the early life of this master endoscopist. Jackson, in his student days, wished to visit England to work with MacKenzie. Lacking the necessary funds, he was given $50 by a patient, in return for which Jackson was to treat the patient (perhaps for some chronic laryngeal complaint) "for the rest of his life," — surely a long-term contract.

Jackson's first tracheotomy was performed on the young daughter of a drunken father, to whom she had refused to give a dime for liquor. She had the coin in her mouth for safekeeping and had aspirated it when her father tried to choke her.

Questioned by a student, Jackson once said that in all his experience he had never removed a fishhook from a lung. Asked if he believed it possible, he replied that since he had spent two hundred and eighty-three hours of practice on this problem he did not consider it beyond solution.

Such are the painstaking labors and study that have laid the foundation of this specialized procedure, in which brilliant and spectacularly dramatic results are so often seen.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

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CASE 37301

PRESENTATION OF CASE

First admission. A sixty-five-year-old woman was admitted to the hospital because of arthritis, faintness and chest pain.

Six years before entry the patient had an episode of pain, swelling and redness involving numerous joints, particularly those of the fingers, and the elbows, shoulder, hip and knees. Similar attacks had recurred over the years, leading to deformities that were most marked in the hands. About two years before admission the patient noted weakness and easy fatigability. A diagnosis of "anemia" was made and she was treated with iron and liver, but despite this therapy she became progressively weaker. One year prior to entry she had a sudden attack of severe chest pain localized anteriorly in the region of the left lung base, markedly aggravated by breathing. She developed dyspnea and fever but no cough, cyanosis or hemoptysis. These symptoms subsided over a period of a week, during which time she was confined to bed. There had been several similar episodes since that time. During the past year she had also noted a rash over the nose. Two weeks before entry she developed a symmetrical nonpruritic rash over the forearms, chest, buttocks and feet. Her appetite had become progressively poorer during the last two years of her illness, and she had lost thirty-three pounds in weight. Additional symptoms, not definitely dated in onset, were soreness over the entire skull, intermittent eyeball pain, loss of hair of the head, appearance of "small lumps in her lips lasting one to two days," a nonproductive morning cough, a sensation of choking toward the end of meals, dizziness even while in bed, four-times nocturia and numbness in the shoulders. Symptoms had been persistent and moderately progressive. The patient had taken many medications but did not know the nature of any.

The patient was married and had two children. The family history was negative and there was no history of exposure to poisons.

Physical examination revealed maculopapular eruptions on the nose and extensor surfaces of the forearms, knees and tibias. There was tenderness over the scalp. The axillary and supraclavicular lymph nodes were palpable, enlarged and rubbery. The lungs, heart and abdomen were negative; the liver and spleen were not palpable. The hands showed arthritic deformities, and there was limitation of motion in the elbows and temporomandibular joints.

The temperature, pulse and respirations were normal. The blood pressure was 110 systolic, 75 diastolic.

The urine had a specific gravity of 1.020 and gave a +++ test for albumin; the sediment contained 2 red cells, 2 white cells and no casts per high-power field. Examination of the blood revealed a hemoglobin of 8 gm. and a white-cell count of 3500, with 68 per cent neutrophils; the red cells were normochromic and normocytic. The total protein was 5.87 gm., the albumin 2.85 gm., the globulin 3.02 gm., the nonprotein 40 mg., the sugar 97 mg. and the uric acid 4.2 mg. per 100 cc. The prothrombin time was 18 seconds (normal, 17 seconds).

In the hospital the patient showed little change clinically. A phenolsulfonphthalein-excretion test produced 25 per cent in one hour and 35 per cent in two hours. A urine-concentration test showed specific gravities of 1.010, 1.010, 1.015 and 1.012. A urine-urobilinogen determination could not be carried out because of the presence of albumin. Wintrobe studies disclosed a red-cell count of 4,300,000, a hematocrit of 22, a hemoglobin of 7 gm., a mean corpuscular volume of 51 cu. microns, a mean corpuscular hemoglobin of 17 micromicrogm. and a mean corpuscular hemoglobin concentration of 31 per cent. A Congo red test showed 77 per cent retention in the serum; the blood cholesterol was 172 mg. per 100 cc. and the sedimentation rate 1.94 mm. per minute. An electrocardiogram was within normal limits. A roentgenogram of the chest showed a few scars in the lungs and a few calcified lymph nodes. There was thickening of the pleura in each costophrenic angle or possibly some fluid. The heart was generally enlarged and the aortic knob was calcified (Fig. 1). X-ray films of the hands and wrists demonstrated narrowing of most of the interphalangeal joint spaces and proliferative changes about the margins. The bones were decalcified. An x-ray film of the skull and a plain film of the abdomen were negative. "L. E." cells were demonstrated in the patient's own buffy coat and in a mixture composed of a physician's cells and the patient's serum.

Treatment consisted of blood transfusions and supportive therapy, and the patient was discharged

at her own request on the seventeenth hospital day. Numerous urinalyses disclosed a specific gravity ranging from 1.013 to 1.022 and ++ to ++++ tests for albumin; a few sediments contained occasional granular or hyaline casts. The white-cell count never rose above 5200, but the blood hemoglobin was elevated to 12.5 gm. after transfusions.

Second admission (three and a half months later). In the interval the patient had pursued a rapidly downhill course characterized by headache, vomiting preceded by marked nausea, generalized itching and decreased vision. Her appetite had been poor. She had nocturia, insomnia and a cough productive of whitish sputum. Chest pain of pleuritic character had become more or less constant, and during the last few weeks she had remained in bed much of the time.

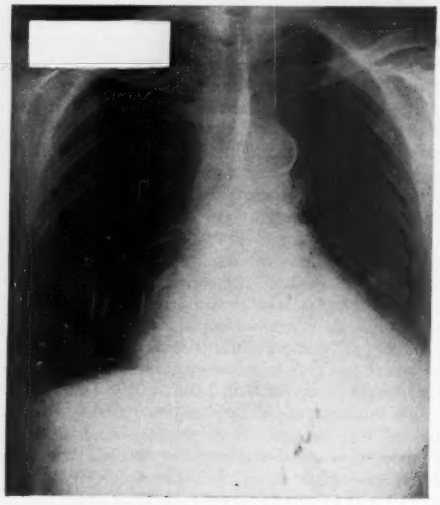

FIGURE 1.

On physical examination the patient responded somewhat slowly. The left pupil measured 3 mm. in diameter, the right 2 mm.; both reacted promptly to light and on accommodation. The disk margins were blurred and showed recent hemorrhages bilaterally. On the right there was extensive fluffy exudate and on the left extensive thrombosis of veins and arteries. There was some puffiness about the eyes. There were palpable small lymph nodes in the cervical, axillary and inguinal areas. The lung bases showed decreased resonance with a few inspiratory rales on the right. The heart rate was 84, with many ventricular premature beats. The point of maximum impulse was 1 cm. to the left of the midclavicular line. The pulmonic second sound was louder than the aortic. There were blowing Grade I to II apical and pulmonic murmurs. The liver was 2 fingerbreadths below the costal margin and slightly tender. The spleen was not palpable. There was + sacral edema and ++ edema of the legs extending up to the knees. An erythematous maculopapular rash was present over the back, arms, nape of the neck and bridge of the nose.

The temperature, pulse and respirations were normal. The blood pressure was 195 systolic, 90 diastolic.

The urine had a specific gravity of 1.011 and gave a +++ test for albumin; the sediment contained 2 to 5 white cells, 15 to 20 red cells and a few granular and hyaline casts per high-power field. The hemoglobin was 8.0 gm. and the white-cell count 3900, with 82 per cent neutrophils. The blood sugar was 89 mg., the total protein 5.18 gm., the albumin 2.28 gm., the globulin 2.90 gm. and the nonprotein nitrogen 62 mg. per 100 cc.; the sodium was 136.0 milliequiv., the chloride 75 milliequiv., the potassium 5.2 milliequiv. and the carbon dioxide 15.9 milliequiv. per liter. An electrocardiogram showed nonspecific T-wave changes. An x-ray film of the chest showed essentially the same findings as at the time of the previous admission.

The patient was treated with cortisone, 100 mg. per day, for three weeks, during which time she had less itching, no vomiting, a better appetite and a sense of well-being. The nonprotein nitrogen, however, continued to rise despite this therapy; because of this the cortisone administration was stopped. It was believed that the patient was approaching renal failure and that little could be done for her. She was discharged on the thirty-eighth hospital day.

On returning home the patient continued on a downhill course, with intermittent itching and vomiting and increasing weakness. She also developed cough, orthopnea and hemoptysis, raising clots up to teaspoonful size. Death occurred during a coughing paroxysm about three weeks after discharge from the hospital.

DIFFERENTIAL DIAGNOSIS

DR. J. SYDNEY STILLMAN*: That lupus erythematosus cells were demonstrated in the patient's buffy coat makes me very suspicious and reminds me of the remark of Virgil: "I fear the Greeks while they are bearing gifts."

This patient for four years had episodes of polyarthritis without much evidence of systemic disease, and then two weeks before admission there was a change.

May I see the x-ray films, Dr. Wyman? I presume the x-ray films of the skull were taken to rule in or out multiple myeloma which, of course, has to be thought of in joint disease, with a high sedimentation rate and anemia. I think that many of us

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have missed a diagnosis of multiple myeloma because there was no Bence–Jones protein in the urine or no plasma cells were seen in the peripheral blood.

DR. STANLEY M. WYMAN: The films of the chest in the first examination demonstrate what I think is probably a small quantity of fluid in the pleural space, rather than thickened pleura. The heart shadow is large but shows no characteristic configuration. I wonder how much of the enlargement is due to the heart itself and how much to fluid in the pericardium. There is a definitely calcified aortic arch (Fig. 1). The lung fields are not grossly remarkable. The films of the skull show no localized disease. The joint spaces of the hands and wrists are narrowed, as recorded, the most pronounced changes being about the terminal interphalangeal joints, with considerable hypertrophic changes; in addition there is rather severe osteoporosis. The arthritis type seems to be mixed — rheumatoid and degenerative. I would wonder, from the films alone, about psoriatic arthritis.

DR. STILLMAN: The terminal phalanges are involved in rather destructive change. The index finger shows the classical deformity of rheumatoid arthritis, with flexion of the proximal joint and extension of the terminal one, but it is rather difficult to be sure of the type of arthritis from the x-ray film alone.

DR. WYMAN: There is some abnormality of the index finger, which may be due to an old injury or may be congenital. The later films of the chest show essentially the same findings as previously, except that there is more fluid in the pleural space and atelectasis or possibly some pneumonitis in the left lower lobe. The later films of the skull demonstrate no definite localized changes.

DR. STILLMAN: In attempting to unravel these knotty problems it is generally a good principle to try to explain all the symptoms and signs of the patient's illness on the basis of one disease. Inasmuch as the diagnosis, lupus erythematosus, to a degree has been given to me it is quite a temptation to accept it and close the discussion. However, I am unable to explain the case entirely on the basis of disseminated lupus erythematosus.

In the first place, let us consider rheumatoid arthritis. Could that conceivably explain this patient's whole illness? The clinical course, certainly the first four years of it, sounds rather like rheumatoid arthritis, — the widespread joint involvement, the episodic nature of the disease and the development of permanent deformities. Then the disease changed its course and the patient went steadily downhill. Certainly one sees in rheumatoid arthritis patients who run very malignant courses, with fever, serous-surface involvement and cardiac damage. They can develop various types of renal disease — amyloid disease, pyelonephritis or glomerulonephritis. One could even account for the rash on the basis of rheumatoid arthritis, but the leukopenia and the presence of the lupus erythematosus cells could not be fitted into this diagnosis. I should like to persist in my belief that the first four years of the patient's illness were different from the last two, and I should like to believe that she had rheumatoid arthritis during the first part of the illness and then developed something else.

What part of the symptom-complex that this patient showed could lupus erythematosus have explained? Certainly it could have accounted for the systemic signs of weakness, weight loss, fever, anemia and lymphadenopathy and could have accounted for the marked chest pain, which is common with involvement of the serous surfaces. The distribution of the rash was certainly consistent with disseminated lupus. The rash as described certainly does not sound like psoriasis, although the involvement of the terminal phalanges makes one think about it. Disseminated lupus would also explain the kidney damage demonstrated during the first hospital admission. It is rather rare for patients with disseminated lupus erythematosus to die in renal failure, and this patient certainly approached it, with her marked diminution in kidney function. Also, hypertension in patients with disseminated lupus is a very rare complication, even terminally, with the fair degree of renal damage that such patients develop.

Another in this group of closely related collagen diseases is polyarteritis nodosa. This could account for many of the abnormalities just as well as lupus erythematosus can. However, there are some important differences. In polyarteritis there is commonly a leukocytosis rather than a leukopenia. I am not familiar with any long-standing rashes of this distribution that occur in polyarteritis. However, it could better account for the renal failure that led to the terminal phase of the patient's illness. Multiple pulmonary infarcts, a common occurrence in polyarteritis, could have caused the hemoptysis. I should like to interject that I have seen several cases in the last two years with lesions in the lung parenchyma very similar to the Aschoff nodules that one sees in rheumatic fever — and yet they occur in people with rather typical rheumatoid arthritis! The pathologists found the lesions to be somewhat atypical Aschoff nodules, and they were not at all happy about making a diagnosis of rheumatic fever. Both these patients developed marked pulmonary hypertension and increasing respiratory distress. Whether something of that sort had developed in this patient I do not know. I think it would possibly be better to explain the pulmonary symptoms on the basis of repeated pulmonary infarctions.

There is a fundamental hotly debated question whether the collagen or connective tissue diseases are related. One is impressed by seeing two patients who present essentially identical clinical pictures in adjacent beds in the hospital of whom one demon-

strates the lupus erythematosus cells and the other does not. One patient's condition is called rheumatoid arthritis, and the other condition, because of the laboratory findings, is considered disseminated lupus. The average case of rheumatoid arthritis on the one hand and the usual case of lupus erythematosus on the other can be differentiated quite readily, but there is a twilight zone where cases of the two diseases become more and more similar. Whether they actually merge in the center is something I cannot answer. I have seen a case of dermatomyositis in which the symptoms of dermatomyositis disappeared toward the end and in which the outstanding autopsy findings were actually those of polyarteritis nodosa.

In summary, I think the patient had changes that I would consider those of rheumatoid arthritis. I think she also had disseminated lupus and I would not be at all surprised to find in the kidneys, in addition to the wire-loop changes that have been described as characteristic of lupus, some larger-vessel changes that would be consistent with polyarteritis. I began by trying to explain this on the basis of one disease. I am ending up with a mixed grill. I probably shall regret it, but it seems to me that these diseases merge with one another so frequently that it is extremely difficult to draw the line — certainly clinically and sometimes even pathologically.

Dr. Marian W. Ropes: We had much the same difficulty as Dr. Stillman did in deciding where in the group of connective-tissue diseases to place this patient's disease. Lupus erythematosus is unusual in a woman over sixty years of age, although it does occur. However, we believed we had to make a diagnosis of disseminated lupus erythematosus in view of the lupus cells, the rash, which was not typical but was not entirely atypical, and the renal involvement, which we thought was part of the general disease. We raised the question of some other type of renal disease's being present also because we believed the degree of renal involvement was unusual for lupus erythematosus. It has been our practice to assume that joints of this type were due to rheumatoid arthritis, but more and more we hesitate to say that disseminated lupus erythematosus cannot cause such changes. I do not know the answer. I would say that this patient had chronic joint disease that was in no way distinguished from rheumatoid arthritis but may have been part of the lupus erythematosus.

No one expected this patient to do well on cortisone; the renal disease was her main difficulty, and we have no evidence that cortisone improves renal disease. However, we believed that this was one more case to prove that cortisone does not improve renal disease. She went downhill on treatment. There was one other reason for giving cortisone. There was some question whether the eye signs were due to lupus erythematosus or to renal disease. If they were due to lupus, we believed they might improve on cortisone.

I should like to hear Dr. Cogan's opinion concerning whether the eye signs were due to lupus erythematosus or to renal disease.

Dr. David G. Cogan: The eyes showed diffuse hemorrhages throughout the fundi that were quite nonspecific. The distribution of the changes was that which one sees in hypertensive retinopathy, but one never sees the quantity of hemorrhages and exudates that she had without more marked changes in the vessels when it is due to hypertension alone. Despite what the record says, it was my opinion that the vessels showed very little change. They were certainly not proportionate to the extensive retinopathy. I think the change was not secondary to the renal disease.

Dr. Ropes: I think it was the impression that there was some improvement in the eye condition, due to cortisone.

Dr. Cogan: I did not see the patient after she was treated with cortisone.

Dr. Ropes: It was questionable, but the ophthalmologist who saw her believed that there was some improvement and that this gave further suggestion that the eye changes were associated with disseminated lupus erythematosus rather than with renal disease.

Clinical Diagnosis

Lupus erythematosus disseminatus.

Dr. Stillman's Diagnoses

Rheumatoid arthritis.
Lupus erythematosus disseminatus.
?Polyarteritis nodosa of kidney.

Anatomical Diagnoses

(*Lupus erythematosus disseminatus.*)
Polyarteritis nodosa.
Rheumatoid arthritis.
Myocarditis with Aschoff nodules.
Glomerulitis, focal, acute and chronic.
Endocarditis of mitral valve, acute and chronic.
Pericarditis, fibrinous and fibrous, with extensive edema.

Pathological Discussion

Dr. Tracy B. Mallory: The diseases of this group are quite as hard to distinguish anatomically as they are clinically—perhaps harder—and very often clinical and anatomic evidence do not agree very well in a matter of classification. Some of you may remember a case of apparently clinically typical disseminated lupus erythematosus discussed by Dr. Soma Weiss[1] some years ago in this amphitheater in which the autopsy showed a widely disseminated polyarteritis nodosa. That was the major anatomic finding in the case under discussion. Grossly, the most impressive lesions were a severe

pericarditis with marked thickening of the pericardial tissue, as well as a considerable accumulation of fluid, some degree of endocarditis of the mitral valve and very peculiar kidneys. They were of approximately normal size, or only very slightly enlarged. The cortex was described as being of a greenish-gray color. There were no areas of infarction such as one would expect if the renal lesion was secondary to the vascular one. Microscopical preparations showed the presence of widespread vascular lesions in virtually every organ of the body. In the kidneys there were occasional examples of the so-called wire loops, but others were obscured by severe diffuse glomerulitis with fibrinoid necrosis of the tufts, an appearance that has been described in polyarteritis nodosa by Davson, Ball and Platt.[2] The mitral vegetations showed fibrinoid necrosis, and scattered through the myocardium were numerous foci quite typical of Aschoff bodies.

DR. WILLIAM CLARK: If you finally classify the patient as having had polyarteritis nodosa, then it would be the first case to my knowledge demonstrating lack of specificity of lupus erythematosus cells during life. If the lupus erythematosus cells are significant, I would say what Soma Weiss said, — that this was actually lupus erythematosus with widespread vascular lesions similar to periarteritis nodosa.

DR. MALLORY: By now there have been a great many cases, here and elsewhere, of clinically typical lupus erythematosus that have showed widespread polyarteritis nodosa at autopsy.

DR. STILLMAN: Isn't that true also of dermatomyositis?

DR. MALLORY: I believe it to be true. It also can be true of rheumatic fever. The existence of arteritis lesions does not rule out any other diagnosis.

DR. ROPES: And the relationship of the lesions to the clinical picture remains unknown!

DR. WILLIAM CLARK: And the finding of Aschoff bodies does not make it necessary to make a diagnosis of rheumatic fever!

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CASE 37302

PRESENTATION OF CASE

A thirteen-year-old girl entered the Emergency Ward because of inability to walk and general muscular stiffness and soreness of less than twenty-four hours' duration.

During the two weeks prior to admission her entire family, including the patient, had had mild upper-respiratory infections without any unusual manifestations. On the morning of admission, after getting out of bed, the patient fell and had to be carried back. After that she claimed that she could not walk and complained of muscular stiffness and soreness. There was no history of malaise, gastrointestinal disorder, headache, dysphagia or sensory disturbance.

The family and past histories were not contributory.

On physical examination there was weakness of the lower limbs with generalized muscular tenderness. The deep tendon reflexes were hypoactive and equal, the abdominal reflexes absent, the plantar reflexes flexor. The gag reflex was present. There was no rigidity of the neck. The examination was not remarkable in other respects.

The temperature was 98°F. (rectal), the pulse 80 and the respirations 20 per minute.

The spinal fluid was under an initial pressure equivalent to 80 mm. of water, and contained no white cells, and 59 mg. of sugar and 80 mg. of protein per 100 cc. Examination of the blood showed a hemoglobin of 14.5 gm. and a white-cell count of 7700, with 80 per cent neutrophils, 10 per cent lymphocytes and 10 per cent eosinophils. The sedimentation rate was 19 mm. per hour (Wintrobe). The throat culture resulted in growth of abundant alpha-hemolytic streptococci and a few beta-hemolytic streptococci. Culture for Klebs–Loeffler bacillus was negative.

During the first nine hours in the hospital there was little change. The patient sat up to drink fluids; she could not void; she coughed occasionally, but the lungs remained clear. The next morning she was dyspneic. The respirations were 80 and the pulse 104. Chest expansion was markedly decreased and there appeared to be no diaphragmatic movement; there were moist rales at both lung bases. The throat was filled with mucus. There were pain and resistance to neck flexion as well as discomfort on rotation. Movement of the right angle of the mouth was weak. The palate moved bilaterally, and a moderately active gag reflex was present. Strength of the upper limbs was generally reduced but fair, except for paralysis of abduction of the left arm. Upper-thoracic movements were reduced. The abdominal muscles contracted well. The patient could lift either leg only about two inches from the bed. Foot and toe movements were proportionately stronger than hip and knee movements. Triceps, biceps and knee jerks were present. Brachioradialis and ankle jerks were flexor. Sensation was normal.

Catheterization proved necessary; 560 cc. of urine was obtained, which showed a specific gravity of 1.022, no albumin, no sugar and a + test for acetone. The white-cell count rose to 23,500, with 92 per cent neutrophils.

Fifteen hours after admission the patient complained of "tired" breathing, with inability to breathe at times, and was placed in the respirator. Pharyngeal mucus necessitated suction. On the

third hospital day she was partially disoriented and identified various persons incorrectly. The temperature rose to 101.2°F. and the white-cell count rose to 30,400. She voided small amounts of urine spontaneously, but seemed unaware of this until she felt wet. Collapse of the right lung necessitated bronchoscopy; a thick, creamy exudate was aspirated from the right-lower-lobe bronchus. Breath sounds again became audible and the patient was more comfortable. On the fourth hospital day x-ray examination showed a homogeneous density of the right hemithorax. The patient tolerated a fifteen-minute period out of the respirator. She was conscious but markedly fatigued. On a few occasions swallowing was difficult. On neurologic examination the facial weakness was unchanged. External ocular movements could not be tested satisfactorily. The weakness of the extremities was symmetrical; she moved the upper limbs but not the lower. Superficial and tendon reflexes were absent. Perception of pinprick seemed normal. Bronchial aspirations again became necessary. On the fifth hospital day responsiveness gradually diminished and the patient became comatose. The temperature again reached 101.8°F., the pulse increased to 128 per minute and the blood pressure fluctuated from 60 systolic, 40 diastolic to 110 systolic, 70 diastolic. The spinal fluid showed a positive globulin test, a sugar of 196 mg. per 100 cc., a total protein of 120 mg. per 100 cc. and a colloidal gold curve of 1111222110.

On the sixth hospital day the patient died.

Differential Diagnosis

Dr. Ralph A. Ross*: May I ask for two minor bits of information: the season of the year?

Dr. Tracy B. Mallory: It was about October.

Dr. Ross: And had the child been out of this community prior to entry?

A Physician: No.

Dr. Ross: To recapitulate the course of this patient, the whole family had respiratory infections, and one can speculate on the epidemiologic phase of those infections in this period. There was the sudden onset of ascending paralysis, first obvious in the lower extremities, progressing upward to involve the abdominal muscles, then the muscles at the upper extremities and the intercostal, diaphragmatic and facial muscles and finally clouding of the sensorium. It was noted that this weakness was symmetrical in both lower and upper extremities. The child was afebrile, at least during the early stages of the disease. There was no evidence of acute meningeal irritation during the early stages, and no sensory changes were noted. The respiratory and possibly bulbar paralysis resulted in aspiration and obvious pneumonia toward the end of the course.

May I see the x-ray films, Dr. Wyman?

Dr. Stanley M. Wyman: A period of two days separates the two examinations. Originally there is some patchy mottled density in both lower lung fields, which is more marked in the right lower lobe, and, as Dr. Ross suggested, this is probably a patchy pneumonitis. The second examination shows homogeneous density consistent with pleural fluid throughout the entire right chest that obscures the diaphragm, and there seems to be very little air-filled lung in the right chest. The left chest shows very little change.

Dr. Ross: The laboratory findings are of interest in that the spinal fluid at no time showed pleocytosis but there was an increasing total protein, as indicated by the two readings. The initial sugar was normal, the second considerably above normal, — 196 mg. per 100 cc., — but I suppose the child was receiving intravenous fluids at that time, and probably the blood sugar, too, was quite high. The rise in white-cell count during the course in this hospital can be attributed to the onset of aspiration pneumonia. The culture of the throat, negative for diphtheria bacilli, is of very little value in eliminating or bringing in that diagnosis. The beta-hemolytic streptococci were probably of no great significance except as they may have been involved in the aspiration pneumonia.

Can a space-occupying lesion occurring in the central nervous system produce this chain of events? I should think not. The onset, the rapid progress to death and the absence of increasing central-nervous-system pressure seem to rule out that possibility. Toxins — I have mentioned diphtheria — can produce peripheral paralyses, but the symmetry and the progression of events are very much against diphtheria as a cause of this picture. Lead — another toxin that may cause central-nervous-system symptoms with peripheral neuritis — usually pro-

*Physician to Children's Medical Service, Massachusetts General Hospital.

duces a much more slowly progressive disease, and there were none of the other attendant signs of lead intoxication. Botulism is usually associated with gastrointestinal symptoms and a spotty involvement of the nervous system, particularly starting with bulbar symptoms. I should think it most unlikely in this instance. Tick paralysis could explain this whole picture of a progressive ascending paralysis with aspiration pneumonia leading to death. The eosinophilia may be explained on the basis of the presence of a tick. However, I am assured that the child lived in this neighborhood and that no tick was found — so I shall eliminate that possibility.

Infections? Encephalitis, nonspecific, is unlikely because of the onset with peripheral signs and the absence of fever, although the final picture may not be differentiated. Anterior poliomyelitis? The season was right. The absence of fever, the absence of subjective symptoms, the symmetry and the involvement of the proximal muscles are all against anterior poliomyelitis. The absence of pleocytosis is against, but does not rule out, that diagnosis.

That leads me to the final consideration of acute infectious polyneuritis, which has been termed "radiculomyelitis" and "acute neuronitis" and is more generally known as the Guillain–Barré syndrome. This disease begins after minor infection, with progression of involvement of all the proximal muscles of the lower extremities and the centers of respiration and involvement of the pharyngeal muscles — in most cases of much milder degree and usually after a longer period of time. The finding of an increased total protein in the spinal fluid without pleocytosis is completely compatible with that diagnosis. I shall make my diagnosis acute infectious polyneuritis with aspiration pneumonia. If that is correct, I suppose Dr. Kubik was not able to find any specific histologic picture, as the rapid progress of the condition in this particular child did not allow time for specific pathologic changes in the central nervous system.

Dr. Charles S. Kubik: Did the weakness of the face ever become pronounced?

A Physician: Not as I recall. There was weakness. I do not think it ever became pronounced.

Clinical Diagnoses

Acute anterior poliomyelitis.
Bronchopneumonia.
Pulmonary congestion.

Dr. Ross's Diagnosis

Guillain–Barré syndrome, with aspiration pneumonia.

Anatomical Diagnosis

Guillain–Barré syndrome, with aspiration pneumonia.

Pathological Discussion

Dr. Mallory: The post-mortem examination showed very little as regards the organs other than the central nervous system. There was, of course, a diffuse purulent bronchitis with considerable atelectasis and foci of bronchopneumonia characteristic of an aspiration type of pneumonitis, such as is commonly seen with a considerable variety of diseases that make respiration, and particularly coughing, difficult.

I shall ask Dr. Kubik to tell us the findings in the nervous system, the most definite point probably being that no lesions suggestive of anterior poliomyelitis could be demonstrated.

Dr. Kubik: As Dr. Ross predicted, there was remarkably little that was abnormal in the peripheral or spinal nerves or in the cord or brain. The only change that seemed definitely abnormal was slight to moderate swelling of axis cylinders of peripheral-nerve fibers. There was no axonal reaction of the anterior-horn cells such as is commonly found with diseases of the peripheral nerves, including all types of polyneuritis that come to post-mortem examination. It is doubtful that it would have been possible to make a diagnosis from the histologic findings.

I have some lantern slides that illustrate the pathologic changes that have been seen in other cases of infectious polyneuritis. Sections of peripheral nerve stained by hematoxylin and eosin from a case in which death occurred about ten days after the onset of symptoms show a lymphocytic and mononuclear cellular infiltration, chiefly around the blood vessels and in the interstitial tissue of the nerve. A section in which the myelin sheaths are stained demonstrates minor changes in most of the fibers and more severe degeneration of others. Some of the myelin sheaths are broken up into globular masses. An axis-cylinder stain of the same nerve shows striking changes consisting of fusiform swellings and marked narrowing of many of the fibers. The fibers are not destroyed and would unquestionably return to normal if the disease had be-

come arrested at that point. In the cord there is axonal or retrograde reaction of anterior horn cells. Cellular infiltration like that observed in the peripheral nerves was present in the spinal ganglia. Aside from the axonal reaction, which depends entirely on the disease in the peripheral nerves, we have found no indications of disease in the central nervous system. In particular, we have not found any perivascular infiltration or microglial reaction in the cord or in the brain that would suggest virus infection. We have had other cases clinically typical of this condition in which there were degenerative changes with remarkably little infiltration in the peripheral nerves, so the findings have not been altogether uniform. Most of the patients recover. In the fatal cases the cause of death is not neuritis but some complication — in most of our cases, a pulmonary complication resulting from difficulty in breathing and swallowing and in keeping the airways clear.

A PHYSICIAN: Dr. Kubik, what are the usual sensory changes?

DR. KUBIK: In some cases there has been no objective sensory impairment, although in most of them there has been paresthesia and, in many, some degree of objective sensory impairment. In a few, such as the present case, not even paresthesia was present. The motor fibers are apparently more vulnerable to the disease process, whatever it is, than the sensory fibers. The cause of the disease is unknown, and although it has been called infectious polyneuritis it probably is not infectious. Attempts to transmit the disease to animals have not been successful.

DR. MALLORY: Although this is a relatively unusual — and might even be called a rare — disease, occasionally a considerable concentration of cases occurs, in a geographic area in a limited period of time, that could almost be called epidemic. During the war, at one time, an army general hospital in Naples had 45 cases of this type on the neuropsychiatric service in one day. The findings were very similar to the case that has just been presented, and there was the same paucity of anatomic and histologic findings at autopsy. The majority of patients had been sent to the hospital with the diagnosis of psychoneurosis. It happened that the condition developed in a camp at which men were being taught to float themselves to shore on inflated rubber mattresses in preparation for amphibious landings. These men could not blow up the mattresses. Inability to inflate a rubber mattress shortly before there was to have been an amphibious landing evidently impressed the battalion surgeons as indicative of a neuropsychiatric disorder.

In some fatal cases a clinical diagnosis of poliomyelitis is made, so that at post-mortem examination, although brain and cord are examined, peripheral nerves may not be removed for study. Even when they are removed, findings are often minimal in such a case. The etiology of the disease entity is certainly in complete doubt. I think a good epidemiologic study would probably do more to elucidate the etiology than any other method of investigation.

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THE PRESS AND THE PROFESSION

According to the advice first published in the *Boston Medical and Surgical Journal* of July 2, 1851, and reprinted in the *New England Journal of Medicine* of June 28, 1951:

> It is getting to be quite common for newspapers to have the first, and sometimes the only, reports of remarkable surgical operations. It is all right enough for the papers to publish medical intelligence; but it would be more consonant with our feelings, and more in accordance with professional etiquette, if medical men would first send the results of their cases to a *Medical* Journal.

The nub of the situation as it is today appears to have been the nub of the situation as it was in 1851, and the *Boston Medical and Surgical Journal* seems to have taken a very liberal view of it. It is not that the public should not know the facts of life, but that these intimations of mortality should not be presented as facts until their truth has been substantiated. Premature publicity — indeed, publicity of any sort concerning disease and its treatment — is a dangerous tool unless carefully handled.

Health, when all is well, is taken for granted, but when it is absent the means of its restoration makes news, and the more sensational the circumstances appear to be the better news value the story has — and the greater capacity it may have for doing harm. The dark sea of uncertainty surrounding those phenomena of health and disease of which man still knows so little is safer than the beacon of false hope that may lure thousands of sufferers toward still uncharted channels. A ship is safer when well navigated on the surface of the unplumbed deep than when it is steered by lights that mark no harbor entrance.

This great residual ignorance is more often now than formerly admitted by the physician, who has grown in confidence as his real knowledge has increased. It is unfortunately misinterpreted by the public, which continues to give credence to the long shot — to place an inflationary value on the infinitesimal chance that the "lone wolf," the crackpot or the charlatan may have come upon the ultimate secret of therapeusis.

If the doctors really know so little, with their fussy rituals of examination and appraisal and their pompous etiquette, is there not a good chance that the medicine man with his assurance, his testimonials and his guarantee of cure may have found the true elixir of life?

Perhaps the closest danger, however, lies not in the metallic tractor, the tar water with its multiple virtues, or the universal extract, but in the premature disclosure of that honest effort to help mankind that may yet die a-borning. Too often the excited discoverer himself, eager that his early efforts should be quickly recognized, gives out information that has not yet been properly presented and thoroughly examined before the bar of medical opinion; too often the reporter, seeing only the sensation that his words may cause, types out a story that brings to many false hope as a preliminary to still deeper despair.

Conservatism and a regard for the rights of the public in the matter of news are not irreconcilable.

Honest medical reporting is becoming a specialty, and many journalists are clearing their stories through authoritative sources in order to publish only the medical news that's fit to print.

Slowly the truth is coming to prevail, as the admonition of the old consultant to his overconfident colleague becomes increasingly appreciated — "It is a fine thing to tell the truth, but first be —— sure that it is the truth."

WISCONSIN'S POUND LAW

A MEMBER of the aging generation that in its childhood sympathetically read the tale of Black Beauty, the horse, or of Beautiful Joe, the dog, has a nostalgic affection for the humane society that probably introduced him to these stories and in addition gave him a gold or silver star to wear in token of his regard for dumb animals. But he, in common with all other humanitarians, must also often feel chagrined that in the past thirty or forty years the humane societies have so frequently been used as a "front" behind which an intemperate and sometimes vicious campaign has been conducted against the eminently humane activities of medical investigators. Sensible persons are fully aware that the study of natural or induced disease in experimental animals results in better health not only for mankind but for animals as well.

Not all humane societies are guilty of furthering these campaigns. The Waukesha Humane Society of Wisconsin is apparently willing to co-operate with medical humanitarians and has given dogs to Marquette Medical School, two of which, Annie Okra and Nipper Okra, may go down in history because they have served in studies conducted at the school that led to the discovery that okra may be a blood-plasma substitute. Many other humane societies, however, behave as though they believed it more humane to kill all unwanted animals (they call it "putting them to sleep"). As a result, medical scientists struggle against needless obstacles, such as a lack of experimental animals, in their search for ways to control disease and pain.

Wisconsin is a progressive state, and its people voted in 1949 that unclaimed animals should be turned over to medical institutions for research studies. The state legislature has recently passed supplementary legislation providing that humane societies that fail to comply with the 1949 law shall become "immediately ineligible for any further public assistance or public funds from any county, city or village." Failure to comply with the law may also constitute grounds for revocation of the humane society's corporate charter, in accordance with the provisions of the bill signed by Governor Kohler on June 6.

It is to be hoped, and it is not unreasonable to expect, that the people of Massachusetts may ask for similar legislation here. When the humane societies can be brought to the realization that it is more humanitarian to save dogs from destruction so that they may be used in investigation aimed at helping persons, pets and livestock than to kill all homeless pets, they will have earned the wholehearted support of the medical profession.

RENDEZVOUS WITH HEALTH

THE letter by Dr. Blotner, Dr. Harwood and Dr. Marble, published elsewhere in this issue of the *Journal*, describes a new and most effective device that has been developed to further the interests of both public health and public relations. This is the Diabetes Fair, held in Boston last November under the sponsorship of the New England Diabetes Association, which, apparently the first of its kind ever to be held, "proved so useful and so successful that it seems desirable to place on record the experience gained, in the thought that other groups may wish to adapt it to their own use."

Aimed primarily at discovering the unknown diabetic, the Diabetes Fair has served to increase an intelligent health consciousness in those who have visited it. It is an agency that is designed to promote good public relations — to effect a partnership between the profession of medicine and the public in whose service the business of medicine is conducted. Like the various screening clinics that have been projected, it is intended, but in a broader, more interesting and more educational manner, to become a rendezvous with health.

The medical profession — with the rest of the world — is passing through a period when the rela-

tions of men, one with another and one group with another group, are disturbed by jealousy, distrust and excessive competition. In these days of high and still mounting costs and increasing complexity in the whole organization of social living, the public requires constant assurance that its needs are known and that efforts are being made to fill them.

The public can be taught to appreciate honest information; it does not need to be taught to react to fear. It is ready to recognize the physician as its friend and guide as he shows himself worthy of this confidence. Indeed, every step taken by the profession that shows a concern for the well-being of the public is a step in the direction of better public relations and an eventual asset in the ledger of the general practitioner. Such a step is represented by the Diabetes Fair.

The character of medical practice is progressing, and its practitioners must progress with it. There will always be illness to be treated, lives to be ushered into the world and departures to be eased, but the first function of the physician should become the prevention of disease or its recognition in its earliest stages, and the maintenance of health.

When the private practitioner and the public-health officer can see their duties as mutually interdependent parts of a general plan to benefit the health and happiness of all mankind, then another step will have been taken in the direction of an attainable millennium.

By a report made to the New York Academy of Medicine, by Dr. James Stewart, it appears that about 18,000 people in that city live in cellars, which mode of living cannot fail of proving a prolific source of disease.

Boston M. & S. J., *July 30, 1851*

NEW HAMPSHIRE MEDICAL SOCIETY

DEATHS

MORIN — Jeremiah Joseph Morin, M.D., for forty years represented the highest active ideals of the family doctor.

Born in Lynchtown, Maine, on May 4, 1885, and educated in Bellows Falls, Vermont, Dr. Morin originally studied to become a registered pharmacist. After a brief period as a pharmacist he commenced premedical studies at Syracuse University, later transferring to the University of Vermont Medical School, from which he graduated in 1909. After a two-year internship he established a general practice in Rochester, where he practiced uninterruptedly, except for periodic refresher courses at Harvard, Columbia, New York University and the University of Pennsylvania. He read the medical literature carefully and maintained good fellowship not only with local doctors but also with the leaders in medicine. A unique part of his regular routine was Sunday-evening office hours.

He was an organizer and later the chief of the Frisbie Memorial Hospital Staff, an organizer and a charter director of the Blue Shield in New Hampshire and an active participant in county and state medical societies.

In community affairs and in church, fraternal and patriotic organizations, Dr. Morin's influence and participation were major. He volunteered for army service in World War I and retired with the rank of captain. This distinguished life of active service ended July 3, 1950, when serious illness suddenly became apparent. He died on March 20, 1951, of acute coronary occlusion.

Survivors include his widow, Mary Daley Morin, a daughter, Mrs. Francis Maguire, and four grandchildren.

MORRILL — Leonard B. Morrill, of Center Harbor, New Hampshire, was a real old-time country doctor who nevertheless was up-to-date in his thinking and in his office equipment.

Born in Moultonboro, November 2, 1865, the son of Harrison and Julia (Brown) Morrill, he was educated in the local schools. As a youth he studied under Dr. George Mason of Moultonboro, later graduating from the University of Vermont Medical School. He set up his first practice in 1892, in what is now Winn Lodge. He subsequently moved to Center Harbor Village, where he practiced for over fifty years.

Dr. Morrill was a charter member of the Winnepesaukee Academy of Medicine, formed in 1895, which later became the Belknap County Medical Society. He was camp physician for the many summer camps surrounding Center Harbor, making many of his calls by boat.

Dr. Morrill was a member of the Red Mountain lodge of Masons in Sandwich, the Belknap County Medical Society, the New Hampshire State Medical Society and the American Medical Association. He was an honorary member of the Volunteer Fire Department and a former member of the Grange, and had been town health officer and representative to the General Court.

His widow, the former Ada Berry of Moultonboro, is his only survivor.

CORRESPONDENCE

DIABETES FAIR

To the Editor: As many of your readers know, the American Diabetes Association and its affiliated societies have a continuous program of diabetes detection designed to stimulate both the profession and the lay public to discover those persons, estimated roughly as a million, in the United States and Canada who have unrecognized diabetes, and to bring them under treatment at the hands of their family physicians. The program reaches its climax each fall during "Diabetes Week," which for 1950 was that of November 12 to 18. During this week last year the New England Diabetes Association sponsored an event that proved so useful and so successful that it seems desirable to place on record the experience gained, in the thought that other groups may wish to adapt it to their use. The present time is appropriate, since plans should be made some months ahead.

The method used was that of a Diabetes Fair, a project that, insofar as can be learned, was the first of its kind ever held. The purpose of the Fair was threefold: (1) to make the public aware of the diabetes problem through education designed to demonstrate the value of early diagnosis and treatment of the disease; (2) to present authentic information concerning diabetes by exhibits and lectures to diabetics, relatives of diabetics, the general public and interested professional groups and (3) to demonstrate methods of testing the urine and blood for sugar and by furnishing free tests, to discover previously unknown cases of diabetes.

The Diabetes Fair was held in Boston on November 13 and 14, 1950, from 11:00 a.m. to 10:00 p.m., at Horticultural Hall, a building with large exhibition halls. Admission and tests were free. No accurate count was made, but it was estimated that at least 10,000 people attended. The overwhelming response and unusual interest were gratifying and indicated a desire and need on the part of the public to obtain reliable information about diabetes and its treatment. Accommodations consisted of a large hall in which the exhibits were displayed and the blood tests made, a smaller hall in which motion pictures and film strips on diabetes were shown, a lecture hall with a seating capacity of 500 and facilities for men and women where urine tests were made. Many volunteers aided in making the Fair successful. Technicians, dietitians and nurses from various Boston hospitals, members of the women's auxiliaries of the local district medical societies, members of the Diabetes Section of the United States Public Health Service, business firms, pharmaceutical houses and many others gave valuable aid in time, thought and money.

A variety of exhibits furnished information concerning diabetes and its treatment. They consisted of displays on medical and surgical aspects, dietetics, pharmaceuticals, books, literature and social-service aids. In the main exhibition hall there was set aside a large area in which blood was taken and blood-sugar determinations made immediately while the subject waited and could watch the procedure. This was so popular that often there was a line of 50 or more persons waiting to be tested. After the results were obtained, a doctor gave the report to the patient and discussed it with him briefly. Great stress was placed on advising the subject to see his physician if glycosuria or hyperglycemia was present or if the patient was a known diabetic.

The Diabetes Fair was announced to the medical profession through the newspapers, radio, television, medical journals and handbills. Our experience leads us to emphasize the importance of this phase of the planning and the desirability of making arrangements for such well in advance.

On the first day of the Fair, a lecture program was held in the evening, at which President Leonard Carmichael of Tufts College and Drs. Reed Harwood, David Hurwitz and Elliott P. Joslin spoke.

Motion pictures on diabetes were shown almost continuously during the two days of the Fair. The two pictures shown repeatedly were "They Live Again," a Metro-Goldwyn-Mayer sound film that presents the story of the discovery of insulin, and "The Story of Wendy Hill," a sound film telling of a young woman in whom the diagnosis of diabetes was made. Along with these motion pictures a series of film strips were prepared by the Diabetes Section of the United States Public Health Service with the co-operation of the American Diabetes Association that are intended to help the diabetic to understand the nature of his disease and to learn how to care for himself. The motion-picture films and the film strips are available for loan from the departments of public health of many states and from the American Diabetes Association.

All persons at the Fair desiring blood and urine-sugar tests were offered the opportunity of having them made. Non-fasting specimens of blood and urine were obtained and analyzed immediately in temporary laboratories at Horticultural Hall. The carrying out of such tests was considered not the primary purpose of the Fair but rather an adjunct to the educational features. During the two days of the Fair 2215 persons were tested. Tests for urine sugar were carried out in 1976 persons and for blood sugar in 1321 persons. An extraordinarily high percentage of abnormal tests was obtained, due to the inclusion of many persons with known diabetes and relatives of diabetics. However, it is likely that a goodly number of new cases of diabetes were discovered.

Our experience with this first Diabetes Fair indicated the value of such a venture in the education of the public concerning matters of health. This method of public health education, carried on by physicians and their wives, nurses, dietitians, technicians and volunteer workers, is a workable and relatively inexpensive procedure that would appear applicable not only to diabetes but to other diseases as well. The attendance of many persons with known diabetes was by no means a disadvantage, because an ideal opportunity was afforded for urging diabetics who were found not to be well controlled to return to their own physicians for treatment.

HARRY BLOTNER, M.D.
REED HARWOOD, M.D.
ALEXANDER MARBLE, M.D.
For the New England Diabetes Association
Boston, Massachusetts

PERFORATED PEPTIC ULCER

To the Editor: The article of Drs. Vaughan and Warren in the *Journal* of June 14, 1951, on perforated peptic ulcer reflects a large experience with a condition that is not common enough in family practice for all practitioners to be familiar with it. And it is certainly true that there are cases in which a small perforation is sealed promptly by fibrinous and later fibrous adhesions so that the peritonitis remains local. I remember a case in the practice of Dr. Maurice Richardson in which, in an operation for a large gastric perforation, the duodenum was found to be involved in an old adhesive process and a history was later obtained of a previous attack from which the patient had recovered without medical attendance.

But the purpose of this note is to recall to attention the physical sign, featured in older teachings but not mentioned by these authors, that makes certain the diagnosis of all typical perforations within a few minutes of examination, — namely, disappearance of the normal liver dullness. It seems that only a little pneumoperitoneum is enough to enable the liver to drop away from the abdominal wall so that there is a resonant or even hyperresonant note on percussion.

Thus a triad of immediately obtainable physical signs is pathognomonic: board-like rigidity, complete silence on auscultation and resonance on percussion over the lower ribs on the right where the liver dullness should be.

Another fact in connection with these perforations deserves mention: Not infrequently some hours after the sudden onset the severity of the pain may diminish markedly, — perhaps from the absence of peristalsis, — so that the patient may believe that he is recovering and resist hospitalization. The physical signs, however, remain as conclusive as ever.

FRANCIS W. PALFREY, M.D.
Boston, Massachusetts

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Modern Medicine Annual 1950: An annual volume containing the articles that appeared in the twenty-four issues of Modern Medicine *during 1949.* 8°, cloth, 828 pp., with illustrations. Minneapolis: Modern Medicine, 1950.

The Psychoanalysis of Elation. By Bertram D. Lewin, M.D. 8°, cloth, 200 pp. New York: W. W. Norton and Company, Incorporated, 1950. $3.00.

Saints, Sinners and Psychiatry. By Camilla M. Anderson, M.D., assistant clinical professor of psychiatry, University of Utah. 8°, cloth, 206 pp. Philadelphia: J. B. Lippincott Company, 1950. $2.95.

Faith Healing and Healing Methods Founded Thereon, Including Dr. Shipsey's Healing Methods Scientifically Explained; Its Relationship to Christian-Science, Spiritualism and Prayer, etc. By Dr. Michael Shipsey, M.B., B.Ch., Royal University of Ireland. 12°, cloth, 123 pp. Birmingham: A. H. Saxton, Limited, 1950. 10/6.

NOTICES

CLINICAL CONGRESS

The twenty-sixth clinical congress of the Connecticut State Medical Society and the Yale University School of Medicine will be held at the Yale Law School Auditorium, Grove Street, and at the New Haven Hospital and the School of Medicine, Cedar Street, New Haven, on September 11, 12 and 13, 1951.

(*Notices concluded on page xiii*)

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NOTICES (*Concluded from page 158*)

INTERNATIONAL CONGRESS ON MENTAL HEALTH

The Fourth International Congress on Mental Health will be held in Mexico City, December 11-19, 1951, under the joint sponsorship of the World Federation for Mental Health, La Liga Mexicana de Salud Mental and the Regional Office for the Americas of World Health Organization. Dr. Alfonso Millan, President-Elect of the World Federation, is Chairman of the Mexican Organizing Committee for the Congress.

The four major topics to be discussed at the plenary sessions are: mental health and children; occupational mental health, rural and industrial; mental-health problems of transplantation and migration; and community efforts toward mental hygiene.

The Congress registration fee for members is $12.00, United States currency. A fee of $6.00 for associate members (wives or others accompanying members) will entitle them to attend plenary sessions and any social events that may be arranged. Fees may be sent as a United States postal money order or as a draft on a Mexican bank, although personal checks will be accepted from United States members. Checks should be made payable to the Fourth International Congress for Mental Health and sent to Dr. Alfonso Millan, Chairman, Organizing Committee, Gomez Farias 56, Mexico D.F., Mexico.

Further information may be obtained from Mrs. Grace E. O'Neil, Division of World Affairs, National Association for Mental Health, 1790 Broadway, New York 19, N. Y.

SOCIETY MEETINGS AND CONFERENCES

SEPTEMBER 4–8. American Congress of Physical Medicine. Page 238, issue of February 8.

SEPTEMBER 11–13. Clinical Congress. Page 158.

SEPTEMBER 12–14. Biological Photographic Association, Inc. Annual Meeting, Boston.

SEPTEMBER 19. American Medical Writers' Association. Page 1066, issue of December 28.

SEPTEMBER 19–21. Mississippi Valley Medical Society. Page 1066, issue of December 28.

SEPTEMBER 30–OCTOBER 2. New Hampshire Medical Society. Annual Meeting. Equinox House, Manchester, Vermont.

OCTOBER 29. New York Institute of Clinical Oral Pathology. Page xv, issue of June 14.

OCTOBER 31. New England Obstetrical and Gynecological Society, Hotel Somerset, Boston.

NOVEMBER 4 AND 5. American Society for the Study of Arteriosclerosis. Page xv, issue of July 12.

NOVEMBER 7–9. Pan-Pacific Surgical Association. Page 820, issue of May 24.

DECEMBER 11–19. International Congress on Mental Health. Notice above.

DECEMBER 14 AND 15. Association for Research in Nervous and Mental Disease. Page 958, issue of June 21.

JULY 8–11, 1952. Thirteenth British Congress of Obstetrics and Gynaecology. Page xv, issue of December 14.

JULY 14–19, 1952. International Congress of Physical Medicine. Page 998, issue of June 28.

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING THURSDAY, AUGUST 2

THURSDAY, AUGUST 2

*9:00–10:00 a.m. Grand rounds. Robert Breck Brigham Hospital.

*9:00–10:00 a.m. Grand rounds. House of the Good Samaritan.

FRIDAY, AUGUST 3

*9:00 a.m.–12:00 m. Combined medical and surgical staff rounds. Peter Bent Brigham Hospital.

*10:00 a.m. Surgical clinic. South End Health Unit, 57 East Concord Street, Boston.

*1:30 p.m. Tumor clinic. Outpatient Department, Mount Auburn Hospital, Cambridge.

MONDAY, AUGUST 6

*11:30 a.m.–12:15 p.m. Clinical conference. South End Health Unit, 57 East Concord Street, Boston. Dr. Cleaveland Floyd in charge.

*12:15–1:15 p.m. Clinicopathological conference. Main Amphitheatre, Peter Bent Brigham Hospital.

TUESDAY, AUGUST 7

*12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital.

*1:30–2:30 p.m. Pediatric rounds. Burnham Memorial Hospital for Children, Massachusetts General Hospital.

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